Federal Republic of Nigeria

Data Collection Survey for the Review and Upgrading of Integrated Urban Development Master Plan of Abuja, Federal Capital Territory, Nigeria Final Report

March 2019

Japan International Cooperation Agency (JICA)

Yachiyo Engineering Co., Ltd.
Nine steps corporation

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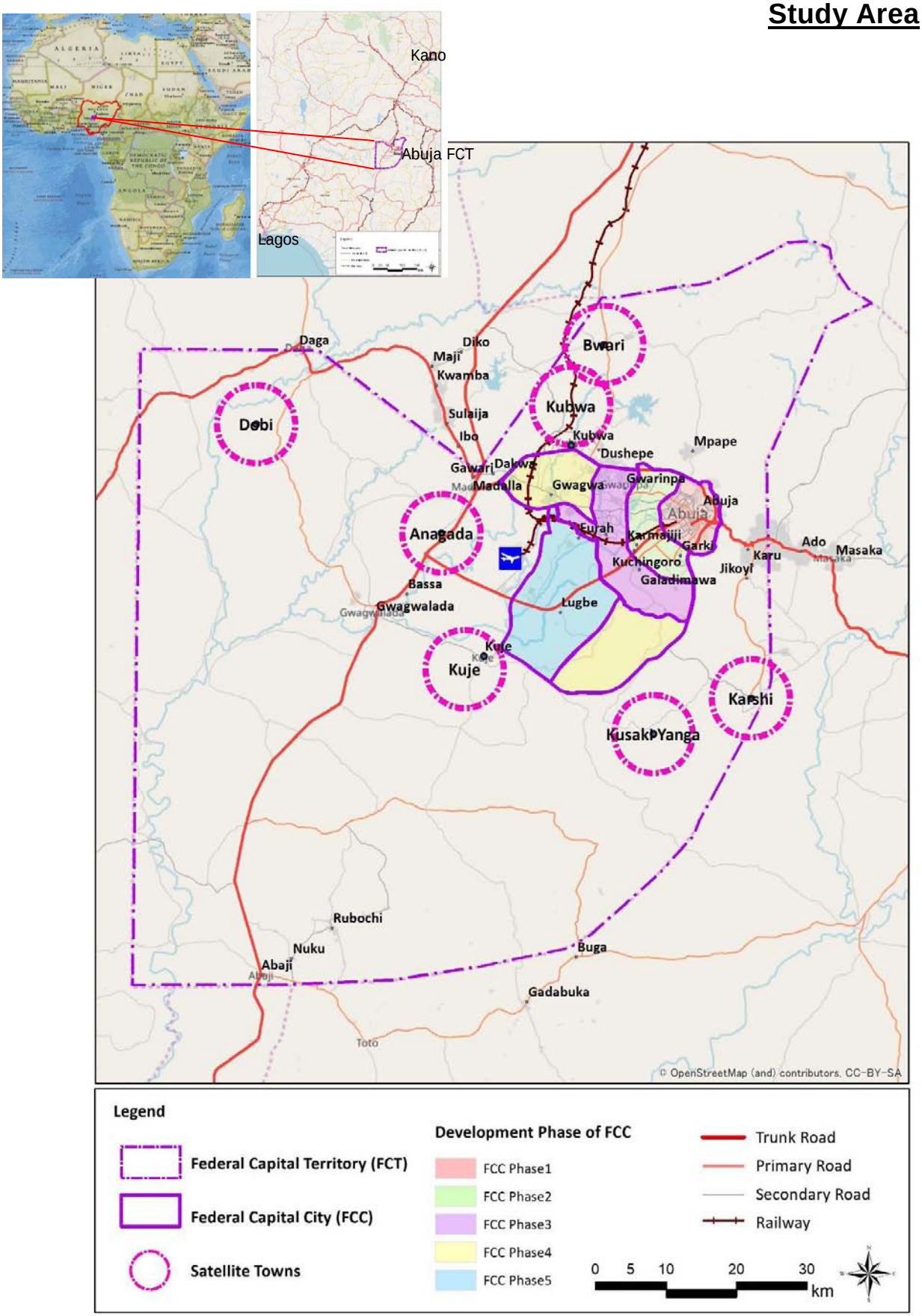
Study Area



Source

Upper left: African continental	: National Geographic World Map
Upper right: Whole Nigeria	: JICA Study Team based on Open Street Map
Below: Enlarged FCT	: JICA Study Team based on Open Street Map

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Abbreviations

AC	:	Area Council
AEDC	:	Abuja Electricity Distribution Company
AEPB	:	Abuja Environmental Protection Board
AFD	:	Agence Francaise de Developpement
AfDB	:	Africa Development Bank
AICL	:	Abuja Investments Company Limited
AIIC	:	Abuja Infrastructure Investment Centre
ALSF	:	African Legal Support Facility
AMAC	:	Abuja Municipal Area Council
AMMC	:	Abuja Metropolitan Management Council
AMP	:	Abuja Master Plan
APDC	:	Abuja Property Development Company
AUMTCO	:	Abuja Urban Mass Transit Company
BRT	:	Bus Rapid Transit
CBD	:	Central Business District
CBO	:	Community Based Organization
CCECC	:	China Civil Engineering Construction Corporation
CMD	:	Centre for Management Development
CP	:	Community Partnership
CTF	:	Clean Technology Fund
DFID	:	Department for International Development
EAD	:	Environmental Assessment Department
EFCC	:	Economic and Financial Crime commission
EIA	:	Environmental Impact Assessment
EIAD	:	Environmental Impact Assessment Division
EPRS	:	Economic Planning Research and Statistics
ES	:	Executive Secretary
ESD	:	Department of Engineering Services
FAAN	:	Federal Airport Authority of Nigeria
FBC	:	Full Business Case
FCC	:	Federal Capital City
FCDA	:	Federal Capital Development Authority
FCT	:	Federal Capital Territory
FCTWB	:	Federal Capital Territory Water Board
FEC	:	Federal Executive Council
FHA	:	Federal Housing Authority
FMBN	:	Federal MORTGAGE BANK OF NIGERIA
FMOE	:	Federal Ministry of Environment
FMITI		Federal Ministry of Industry, Trade and Investment
FMOT	:	Federal Ministry of Transport
FMPWH	:	Federal Ministry of Power, Works and Housing
F/S	:	Feasibility Study
ICRC	:	Infrastructure Concession Regulatory Commission
ICT	:	Information and Communication Technology

IDU	:	Infrastructure Delivery Unit
INEX	:	Inner Northern Expressway
ISEX	:	Inner Southern Expressway
kV	:	Kilo-volt
LF	:	Landfill Site
LGA	:	Local Government Area
LRT	:	Light Rail Transit
M/P	:	Master Plan
MD	:	Managing Director
MDA	:	Ministry, Department or Agency
MDG	:	Millennium Development Goals
MVA	:	Mega-volt ampere
MWp	:	Mega-watt peak
N4P	:	National Policy for Public Private Partnership
NCAC	:	National Council for Arts and Culture
NESREA	:	National Environmental Standards and Regulations Enforcement Agency
NIAF	:	Nigeria Infrastructure Advisory Facility
NIIMP	:	National Integrated Infrastructure Master Plan
NRC	:	Nigerian Railway Corporation
O&M	:	Operation and Maintenance
OBC	:	Outline Business Case
ONEX	:	Outer Northern Expressway
OSEX	:	Outer Southern Expressway
OSGOF	:	Office of the Surveyor General of the Federation
PABX	:	Private Branch Exchange
PCM	:	Pulse Code Modulation
PCTDA	:	Painted Commercial Taxi Drivers Association
PCU	:	Passenger Car Unit
PPP	:	Public Private Partnership
PS	:	Permanent Secretary
PSP	:	Private Sector Partnership
PV	:	Photovoltaic
ROW	:	Right-Of-Way
RR	:	Ring Road
SEA	:	Strategic Environmental Assessment
STDD	:	Satellite Town Development Department
TCN	:	Transmission Company of Nigeria
TOR	:	Terms of Reference
TS	:	Transport Secretariat
URP	:	Urban and Regional Planning Department
VIO	:	Vehicle Inspection Office

Chapter 1 Background and Objectives

1.1 Background

Abuja has been the federal capital of the Federal Republic of Nigeria since 1991, changing the capital function from Lagos (it is hereinafter referred to as "FCC", Federal Capital City). The FCC has been developed by the Federal Capital Development Authority (FCDA) based on The Master Plan for Abuja, the New Federal Capital of Nigeria (AMP) planned in 1979.

Population of the Federal Capital Territory (FCT) including FCC is expected to be around 3.09 million[1] in 2019, and it is expected to increase to 7.17 million[2] by 2040 by the rate of 7.86 % higher than that of national population growth rate at 2%. Nowadays, the importance of the city as economic and social centre, besides the administrative function, has increased due to its drastic population growth and urbanization. Since the FCC is located in the centre of the country, it has a high potential to develop logistics to link various parts of the country, and consequently it is expected to lead the economic development of the country along with Lagos.

On the other hand, the AMP has not been reviewed comprehensively since the initial formulation in 1979, and there are many discrepancies between the plan and the actual development. As several social effects, there are concerns that urban issues, such as traffic congestion, slum development, environmental degradation and pollution, will emerge and negatively impact the economic activities and citizen livelihood. To overcome the above noted concerns and to ensure further economic development, the FCC urgently needs to revise the AMP comprehensively, including the improvement of the infrastructure of all sectors, such as transport, water supply, waste management, power supply, by involving private fund, and reviewing the land use plan to expand urban economic function.

1.2 Objectives

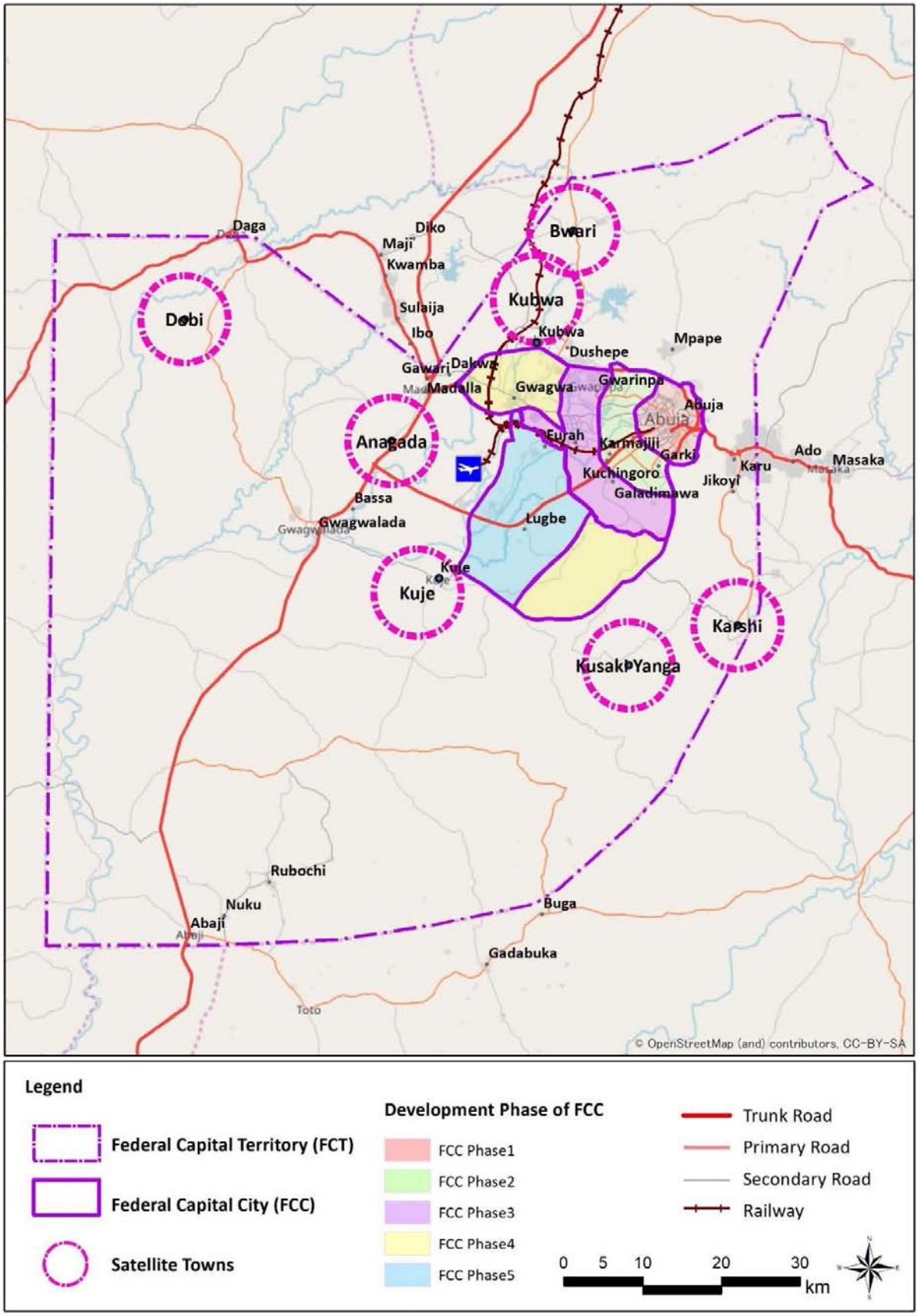
The objective of this study is to collect and analyze basic information and data on the status of the urban development after the implementation of 1979 AMP development in order to specify the future direction of cooperation with the Federal Republic of Nigeria on reviewing and upgrading the AMD targeting the year 2040.

1.3 Study Target Area

This study focuses on the Federal Capital Territory including FCC as the study target. Figure illustrates the study target area.

[1] Source : JICA Study Team calculated based on the Nigeria Census (National Population Commission) and World Population Prospects (United Nation)

[2] Source : ICA Study Team calculated based on the Nigeria Census (National Population Commission) and World Population Prospects (United Nation)

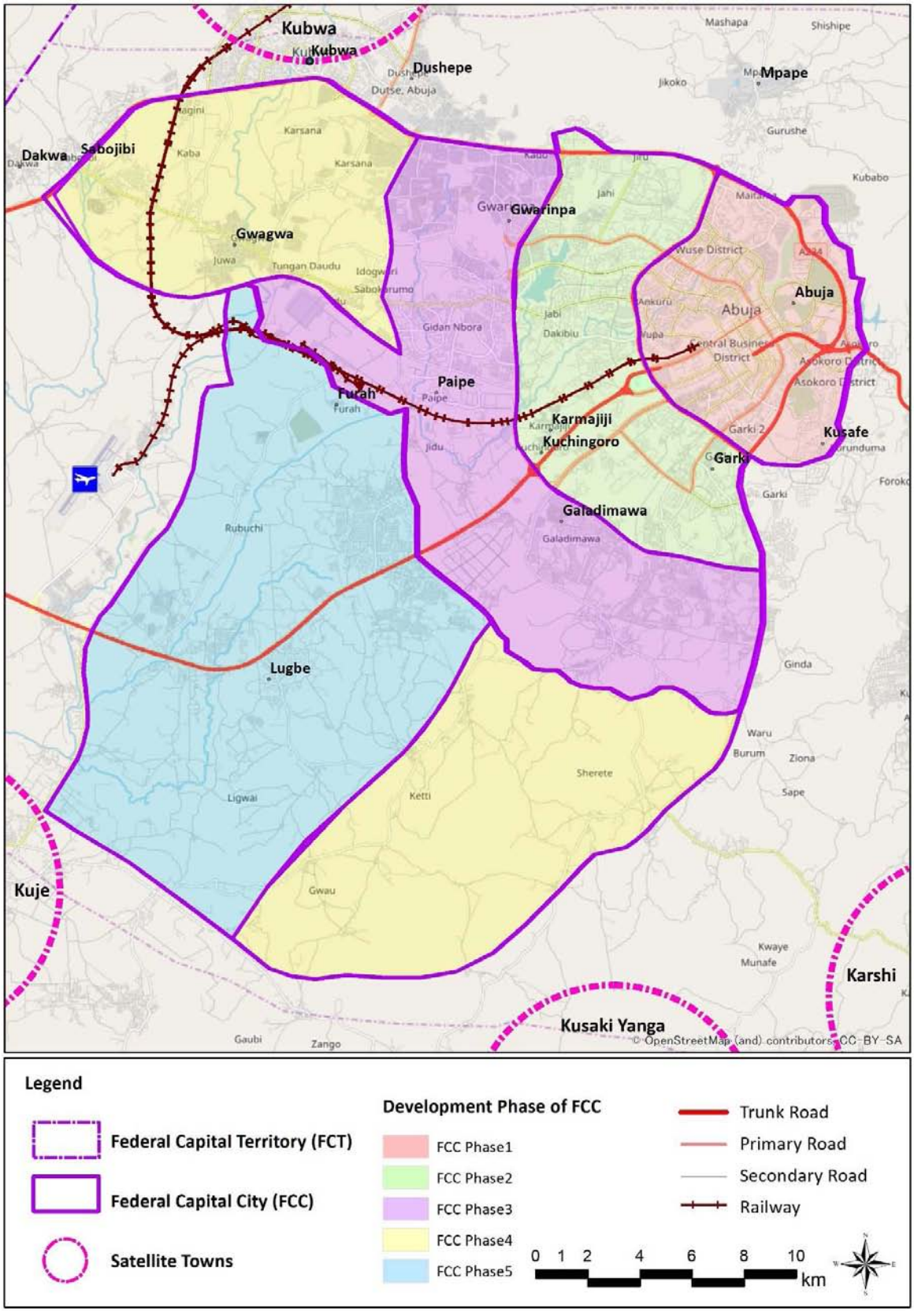


Source: prepared by the JICA Study Team based on the Open Street Map

Figure 1.3.1 Map of Study Target Area (FCT)

1.4 FCC Development Phases

Development within the FCC is divided into five phases from Phase I to Phase V.



Source: prepared by the JICA Study Team based on the Open Street Map

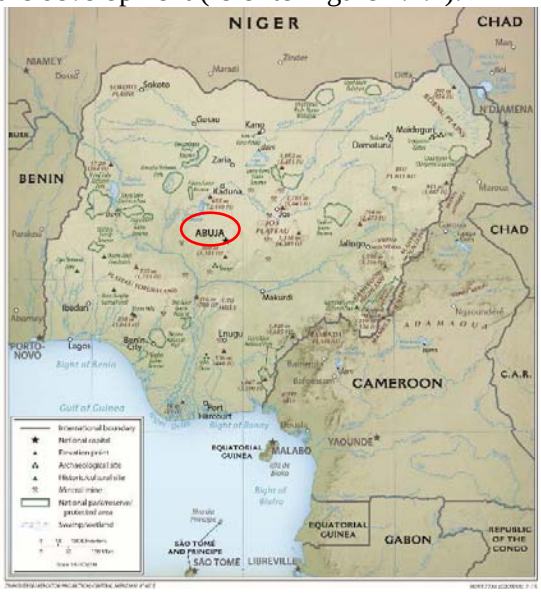
Figure 1.4.1 FCC Development Phases

Chapter 2 Current Condition of Federal Capital Territory (FCT)

2.1 Natural Environment

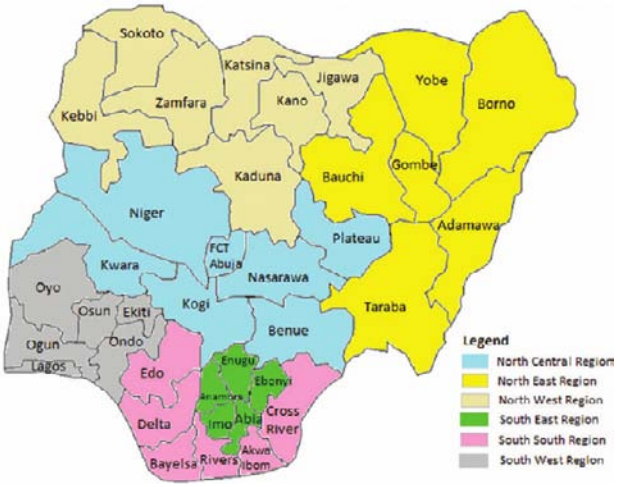
2.1.1 Geographical Condition

Nigeria is located in the middle-west part of Africa, and it has borders with the Republic of Benin to the west, the Republic of Niger to the north, the Republic of Chad to the north-east, and the Republic of Cameroon to the east, and facing the Gulf of Guinea to the south. The Niger River and the Benue River meets at the centre of the country, and flow southward forming the Niger Delta (refer to the Figure 2.1.1). The FCT, the project target area, is located in the centre of the country. It is about 1,600 km away from the economic city of Lagos, but it is located within about 1,000 km from other major cities. The FCT is the capital area directly under the nation to which the capital city Abuja belongs, and it covers a total area of 7,315 km^2 (refer to Figure 2.1.2) [3]. The elevation of the FCT increases gradually from the low land area of the Guara River toward the northeast, and the elevation of the area to the east of and outside the FCC is over 500 m. The elevation of the western part of the FCC ranges from about 200 m to 500 m, and it has several hilly mounds (refer to Figure 2.1.3). The gently sloped land in the lower area is considered suitable for development[4]. The FCC is the new city of the nation planned in 1991 to establish new capital city resettling the central government function from Lagos. The FCC and the area to the west of the FCC are suitable for development[5]. The JICA Study Team recognizes that the FCC replaced Lagos as the capital city in 1991, and it has secured a large area of land for future development (refer to Figure 2.1.4).



Source: Central Intelligence Agency

Figure 2.1.1 Geographical Profile of Nigeria



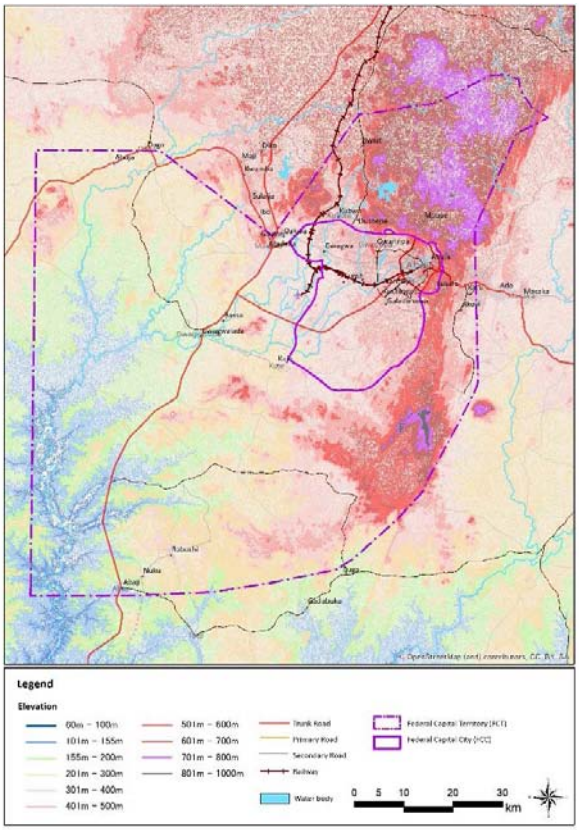
Source: Central Intelligence Agency

Figure 2.1.2 36 Administrative Boundaries of Nigeria

[3] Source: National Population Commission (2006 Census)

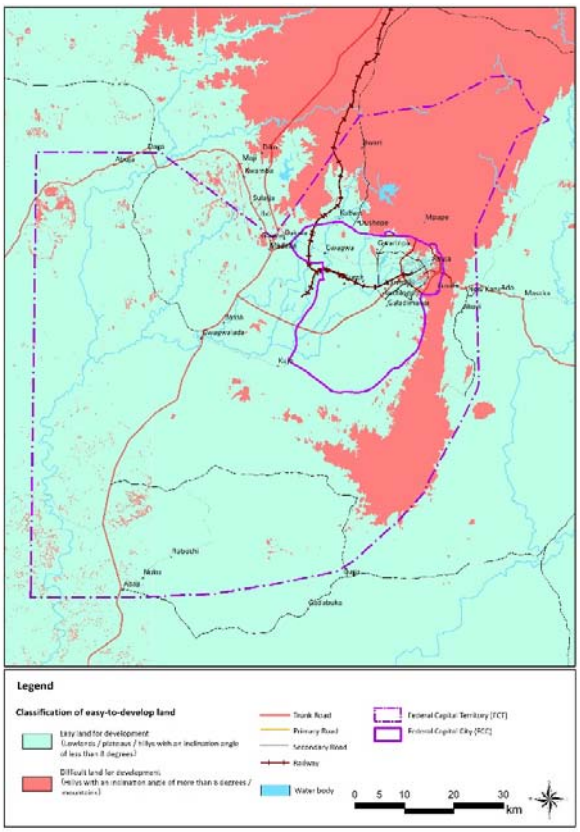
[4] Source: Basics and Application of Land and Water Resource Data, Edited by Kokudo Chosa Kenkyuin, Published by Kokon Shoin (According to the reference book, any land within three (3) degree slope angle could be utilized for any development without major land reclamation or profile adjustment, while any land with slope angle between three (3) to eight (8) degree will be developed although there should be major land profile control using heavy equipment as there is no major problems to apply heavy equipment. Such land with gentle slopes should have no major emergency issues.

[5] Under this survey project, "Development Suitable Land" is categorized as low land, highland, and any land having less than eight (8) degree slope angle (approximately 200m to 600m elevation), and "Development Unsuitable Land" is categorized with any highlands having over eight (8) degree slope angle (600m elevation or higher).



Source: Generated by the JICA Study Team based on ALOS satellite towns image

Figure 2.1.3 FCT Elevation



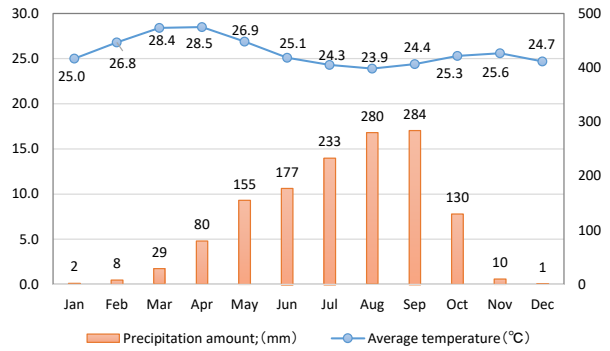
Source: Generated by the JICA Study Team based on ALOS satellite towns image

Figure 2.1.4 Development Potential Land based on the Land Elevation and Slope Angle in the FCT

2.1.2 Climate

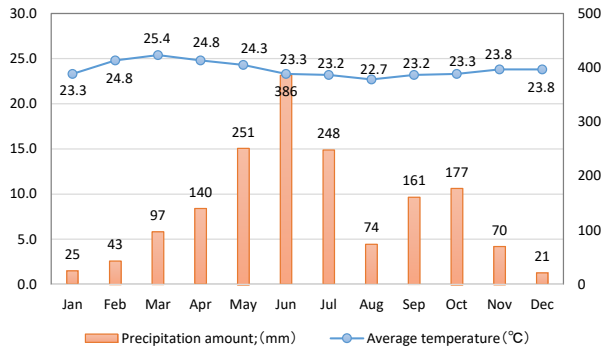
The climate of Abuja is generally tropical with average annual temperature of 27.5 degrees Celsius. The Abuja climate corresponds to the tropical savanna category (Aw) of the Köppen climate classification, and it has rainy season (from May to October) and dry season (from November to April). The monthly average rainfall is about 115 mm, and the amount of rainfall in the rainy season is high, but very low in the dry season.

The temperature of Abuja as well as Lagos is high throughout the year; however, the amount of rainfall in Abuja is much smaller than that of Lagos. JICA Study Team understands that the FCC climate is more comfortable for normal living condition. Figure 2.1.5 and Figure 2.1.6 show the monthly average temperature and monthly rainfall amount of Abuja and Lagos, respectively.



Source: Generated by the JICA Study Team based on climate Data.ORG

Figure 2.1.5 Monthly Average Temperature and Rainfall in Abuja



Source: Generated by the JICA Study Team based on climate Data.ORG

Figure 2.1.6 Monthly Average Temperature and Rainfall in Lagos

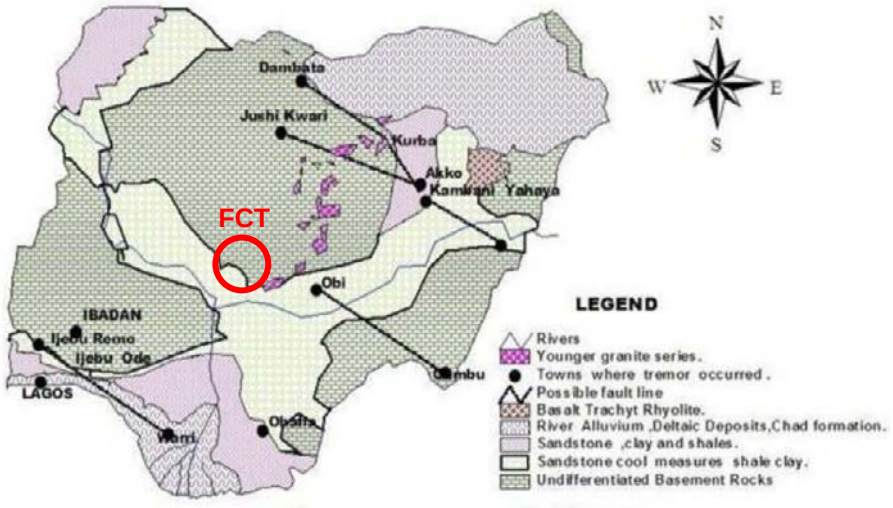
2.1.3 Disaster Occurrence

There is no disaster record database in Nigeria. As shown in Table 2.1.1, there are several earthquakes occurred in the past, and these are small scale and occurred at scattered locations. Figure 2.1.7 illustrates geological information of Nigeria. The soil laid under FCT mainly consists of sand and hard rock, so that the FCT's soil condition is not loose or weak. There is no active fault, either. Therefore, the JICA Study Team considers that there is no serious disaster cause in FCT for urban development.

Table 2.1.1 Records of Past Earthquake Occurrence in Nigeria

S/N	Year-Month-Day	Origin Time	Felt Areas	Intensity/ Magnitude	Probable Epicenter
1	1933	-	Warri	-	-
2	1939-06-22	19:19:26	Lagos, Ibadan, Ile-Ife	6.5 (Ml)	Akwapin fault in Ghana
3	1948-07-28	-	Ibadan	-	Close to Ibadan
4	1961-07-2	15:42	Ohafia	-	Close Ohafia area
5	1963-12-21	18:30	Ijebu-Ode	V	Close to Ijebu-Ode
6	1981-04 -23	12:00	Kundunu	III	At Kundunu village
7	1982-10-16	-	Jalingo, Gembu	III	Close to Cameroun Volcanic Line
8	1984-07-28	12:10	Ijebu-Ode, Ibadan, Shagamu, Abeokuta	VI	Close to Ijebu-Ode
9	1984-07-12		Ijebu Remo	IV	Close to Ijebu - Ode
10	1984-08-02	10:20	Ijebu-Ode, Ibadan, Shagamu, Abeokuta	V	Close to Ijebu-Ode
11	1984-12-08	-	Yola	III	Close to Cameroun Volcanic Line
12	1985-06-18	21:00	Kombani Yaya	IV	Kombani Yaya
13	1986- 07-15	10 :45	Obi	III	Close to Obi town
14	1987-01-27	-	Gembu	V	Close to Cameroun Volcanic Line
15	1987 – 03-19	-	Akko	IV	Close to Akko
16	1987-05-24	-	Kurba	III	Close to Kurba village
17	1988-05-14	12:17	Lagos	V	Close to Lagos

Source: List of Historical / Instrumental Earthquakes Felt in Nigeria



Source: The Review of the Historical and Recent Seismic Activity in Nigeria Region

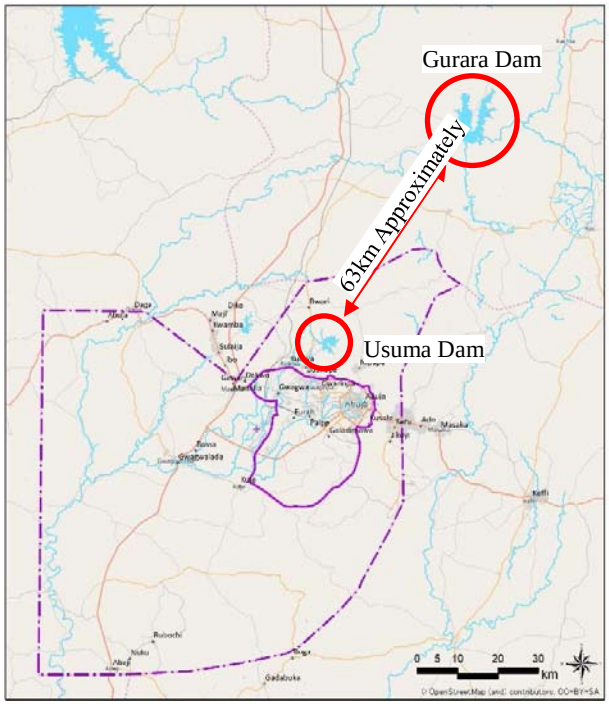
Figure 2.1.7 Geological Map of Nigeria

2.1.4 Water Resources

The groundwater and surface water in the area have the potential to supply the water needed for domestic uses in and around the FCT. The Usuma Dam located north of the FCT has the capacity to supply 820,000 m^3 per day, and the Gurara Dam located 63 km northeast of has a much larger capacity of 3,110,000 m^3. Besides, the groundwater has the capacity of supplying approximately 600,000 m^3 per day[6].

The current (2019) total population of the FCT, including FCC, is about 3,110,000[7] (only considers the amount to supply FCT), and it is expected to increase to 7,170,000[8]. JICA Study Team recognizes that the dams and the underground water will be enough to meet the water demand of the 7.17 million population in and around FCT for domestic purposes.

Further studies, however, should be conducted to confirm if the water resources have the capacity to supply the water needed for agriculture and manufacturing industry purposes. JICA Study Team considers that the detailed information regarding the balance between water supply and demand sides should be carefully analysed. The forecast of future water supply and demand balance in the FCT is discussed in Section 7.1.5.3.



Source: JICA Survey Team

Figure 2.1.8 Location of Water Resource for Water Supply Facility

[6] Approximately 60 m3 / day of FCT groundwater availability is a case considering climate change.

[7] Source: Calculated by JICA survey team based on the" National Bureau of Statistics, Nigeria)" and "World Population Prospects"(United Nations Data)

[8] Source: Calculated by JICA survey team based on the "National Bureau of Statistics, Nigeria)" and "World Population Prospects"(United Nations Data)

2.1.5 Natural Resources

According to the 2011-2015 Strategic Plan for Sustainable Development (Roadmap to Federal Capital Terriory's Future / 2011 / Minister, FCT), there are several mineral resources in the FCT, such as limestone, granite, gemstones (Tantalite, Casseterite). NAIJAQUEST9 also indicates the existence of other mineral resources, such as marble stone, clay, gold, lead, zinc, dolomite in the area. NAIJAQUEST notes that the exploitation for gold has been on gong; however, details of the exploitation and the actual amount of reserves have not been published yet.

2.1.6 Protected Land

There are six categories of protected land and national parks designated in Nigeria in order for protection of natural environment and biodiversity. FCT is not located within any of the following designated areas.

- Forest Reserves
- Wildlife Reserves
- Nature Reserves
- National Parks
- Nature Parks
- Ramsar Convention Sites

2.2 Socio-Economy

2.2.1 Population

Nigeria conducted national level census surveys in 1991 and 2006, and the National Population Commission of Nigeria under the Ministry of Home Affairs manages the census data. According to the census survey, the population of FCT was 370 thousand in 1991 and 1.4 million in 2006. The National Population Commission has been estimating annual population since 2007, and the survey team has recognized that the estimation has not taken the population growth by LGA (Local Government Area) into account or that the estimation could be over expecting the population growth. Therefore, the survey team re-estimated the population growth for the year 2019 and 2040 referring to the estimation made by United Nation. The estimated FCT population is about 3 million in 2019 and 7.17 million in 2040.

The annual population growth rate by each LGA was estimated based on the average population growth rate calculated from the Nigeria National Census data (1991 and 2006) and United Nation's Population Prospects 2019, and found to be 9.28% between 1991 and 2006, 6.26% between 2006 and 2019, and 4.09% between 2019 and 2040. The comparison of population growth rate between FCT and top five populated states between 1991 and 2016 (2019 estimates for FCT) indicates that the FCT grew by 7.86% while other five states by only around 3.0%, and it is apparent that FCT is facing a steep population growth. Table 2.2.1 shows the annual population change of each LGA of the FCT, and the Table 2.2.2 shows the population and population growth rate of the top five populated states.

[9] Internet resource website

Table 2.2.1 Annual Population Change of Each LGA of the FCT

Name of LGA	1991	2006	2019	2040
AMAC	No data	776,298	1,782,173	4,728,800
Within FCC	No data	No data	618,136	3,000,000
Out of FCC	No data	No data	1,164,037	1,728,800
Abaji	21,081	58,642	65,000	66,494
Bwari	No data	229,274	575,000	790,334
Gwagwalada	No data	158,618	287,500	531,956
Kuje	44,338	97,233	300,000	888,176
Kwali	No data	86,174	85,445	173,722
FCT total	371,674	1,406,239	3,095,118	7,179,482

Source: Calculated by JICA Study Team based on the estimation by the Census National Population Commission of Nigeria and "World Population Prospects" (United Nations Data)

Note : The population of years 1991 and 2006 are the result of Nigeria Census. Population estimation for year 2019 and 2040 is based on the estimation of United Nation Population Bureau. The estimation for FCC population is made by population growth plan and actual achievement of development, and the estimation for satellite towns (outside FCC) is made by rough urbanization area calculation and planned population density. The future population of 2040 is distributed in accordance with the value given in the United Nation Population Census data.

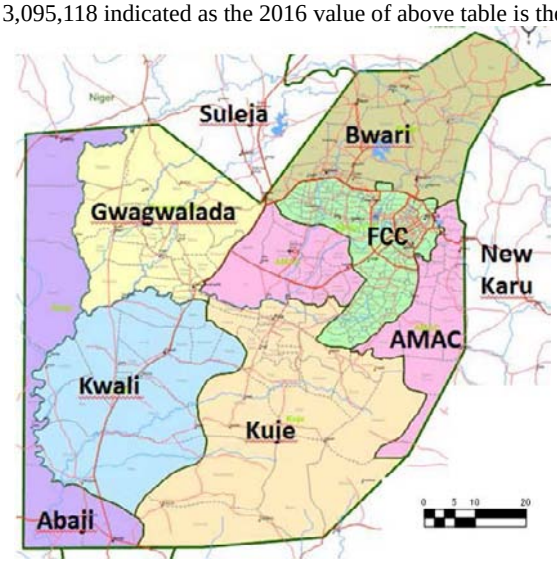
Table 2.2.2 The Number and Growth Rate of Population for the top five populated states

Name of state	1991	2006	2016 (FCT data is for 2019)	The annual rate of population increase from 1991 to 2016 (FCT data is for 2019)
FCT	371,674	1,406,239	3,095,118	7.86%
Kano	5,810,470	9,401,288	13,076,900	3.30%
Lagos	5,725,116	9,113,605	12,550,600	3.19%
Kaduna	3,935,618	6,113,503	8,252,400	3.01%

Source: National Bureau of Statistics, Nigeria (National Population Commission of Nigeria)

Note 1: The population of years 1991 and 2006 are the result of Nigeria Census. The population in 2016 was estimated by the Census National Population Commission of Nigeria.

Note 2: The FCT population value of 3,095,118 indicated as the 2016 value of above table is the estimation at the time of year 2019.



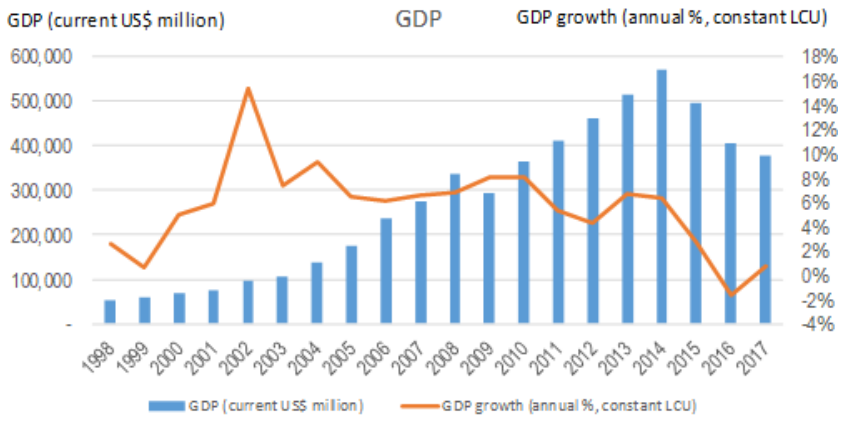
Source: Nigeria Infrastructure Advisory Facility Project Concept Note

Figure 2.2.1 Structure of FCT (6 Area Councils and FCC)

2.2.2 Economy

The economy of Nigeria is recovering because of (1) new currency exchange policy (establishment of special window service for investors and export traders), (2) increase of world crude oil price, (3) high interest of government bond, and (4) tightening of finance, but the recovery rate is still slow.

As shown in Figure 2.2.2, although the GDP has recorded positive growth rates except for 2016, the GDP at current prices was continuously decreasing from 2014 to 2017 by 13%. The major causes of this decline are considered as caused by the crude oil price decrease and weak exchange rate of Naira from 2014 to 2017.



Source: World Bank Database

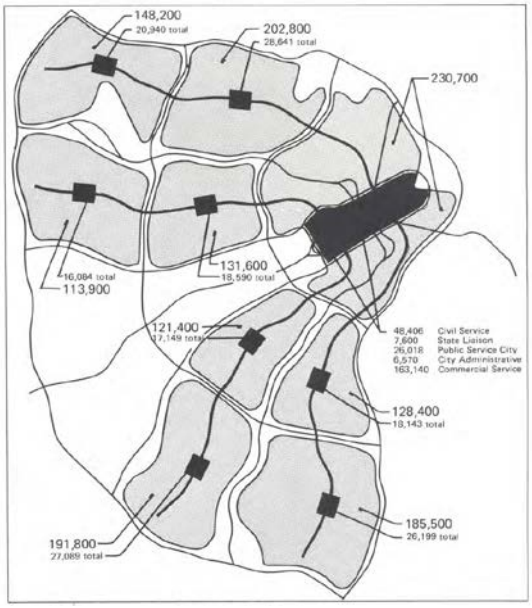
Figure 2.2.2 Actual GDP Growth Rate and GDP at Current Price (USD Base) of Nigeria

2.2.3 Industry

2.2.3.1 Industrial Structure and Working Population

The Federal Ministry of Industry, Trade and Investment (hereinafter referred to as "FMITI") is the core government body responsible of industrial promotion and development in Nigeria. Such kind of government agency is established in each state in general. However, there is no such government agency or body in FCT. There are no statistical data of working population by industrial sectors either, and it is difficult to grasp the current industrial structure of the FCT.

AMP includes a working population plan for the FCC, and the plan indicates that the job will be created in each district as shown in the Figure 2.2.2. The plan has expected about 164 million people to live in the FCC by the year 2000. The plan forecasts the creation of a total of 840 thousand job opportunities. Formal employment accounts for 57% (150 thousand government employees, a total of 320 thousand employees of manufacturing, construction and services, such as financial, insurance, commercial, real estate, telecommunication, transport, etc., necessary for the people living in the FCC), while 43% (about 360 thousand) for informal employment (refer to Table 2.2.3).



Source: AMP (1979)

Figure 2.2.3 AMP's Planned Working Population for FCC (Highlighted by Black Square)

Major industrial sectors in FCC includes government services, core formal services (such as financial, airport, hotels, transport), and manufacturing (construction, block production, etc.), according to the analysis of the industrial structure of the FCT. Moreover, informal businesses, such as street venders, repair shop workers, individual construction workers, brokers, are also recognized inside and outside the FCC.

According to the survey conducted by FCT branch of MDG (Millennium Development Goals) Office, formal employment in FCC accounts for 30% and informal workers for 66% as shown in Table 2.2.4, and this illustrates that the actual proportion of the formal and informal working population indicates the opposite figure of that planned by the AMP. According to the interview to the Chamber of Commerce, the potential industry that could be promoted in FCT includes Agro-village food processing and automobile sectors, which could possibly obtain local materials for manufacturing.

In response to the modification of planned working population for FCC and satellite towns (refer to Section 3.4.2), it is necessary to identify target industries that accommodate and give job opportunities to the working population, and develop a government agency responsible for the examination of industrial development.

Table 2.2.3 Projected Working Population by Employment Type in the FCC (AMP)

	Planned working population in FCC (AMP)	
Regular Employees	57%	485,079
Administrative staffs		159,029
Employees engaged in manufacturing, construction and service industries, etc.		326,050
Non regular Employees	43%	360,500
Total	100 %	845,579

Source: JICA Study Team based on AMP (1979)

Table 2.2.4 Working Population Ratio by Employment Type in the FCC and Satellite Towns (2009)

	Working population in FCC	Working population in the satellite towns（Abaji / Bwari / Gwagwalada / Kwali / Kuje)	FCT total
Regular Employees	30 %	15 %	19 %
Non regular Employees	66 %	83 %	78 %
Others	4 %	2 %	3 %
Total	100 %	100 %	100 %

Source: FCT MDG Office (2009)

Table 2.2.5 Working Population by Employment Type in the FCT

	Regular Employees		Non regular Employees and others	Others	FCT total
	Administrative staffs	Employees of micro / small and medium enterprises and others			
Working population（FCT）	697,875＋α		2,864,961＋α	110,191＋α	3,673,027＋α

Source

Administrative staffs：Statistical Year Book (2010)

Employees of micro / small and medium enterprises and others：SMEDAN AND NATIONAL BUREAU OF STATISTICS COLLABORATIVE SURVEY: SELECTED FINDINGS (2013) / Small And Medium Enterprises Development Agency of Nigeria (2013)

Non regular Employees and others：Calculated by JICA study team based on the ratio of non-regular employees of FCT in Table 2.2.4

Others：Calculated by JICA study team based on the ratio of others of FCT in Table 2.2.4

Note1：SMEDAN classifies companies on four scales depending on the number of employees. Small enterprises are fewer than 10 people, small enterprises are 10 to 49 people, medium enterprises are 50 to 199 people, and large enterprises are over 200 people.

Note2：The values in Table 2.2.5 are indicated as "+ α" because the information to be aggregated is sufficient.

2.2.3.2 Business Environment and Investment Environment

(1) Business Environment

The World Bank has evaluated the business environment in 190 countries, and the report "Doing Business in Nigeria 2018" is published. In the "Doing Business in Nigeria 2018" report, the World Bank has separately evaluated 36 states and the FCT on areas related to "Start of Business," "Obtaining Building Permit," "Real Estate and Property Registration," and "Contract Fulfilment". The FCT ranked higher than other states in activities related to "Start of Business" and "Property Registration" in Nigeria. Starting business in the FCT has advantages over other states in terms registration procedure, duration and cost of the processes. On the other hand, "Obtaining Building Permit" and "Contract Fulfilment" of Abuja are poorly evaluated.

Table 2.2.6 Evaluation Result of Doing Business by State

Unit : Rank

	FCT	Kano	Lagos	Kaduna
Starting a business	1	7	2	5
Dealing with construction permits	27	2	37	17
Registering property	4	7	16	1
Enforcing contracts	27	10	16	1

Source: Doing Business in Nigeria2018 / World Bank

(2) Investment Environment

According to the interviews with the Chamber of Commerce and the Federal Ministry of Industry Trade and Investment, the major problems hindering the private sector investment in the FCT are (1) lack of urban infrastructure, (2) multiple taxation and (3) vague industrial development policy. Particularly the second reason of multiple taxation is significantly serious problem.

Any company who runs a business in the FCT must pay not only corporate tax to the federal government, but also sales tax based on the company's revenue to the government agencies of Abuja Environment Protection Committee (AEPB), Federal Internal Revenue Service (FIRS), Abuja City Area Council (AMAC) and FCDA. Therefore, the JICA Study Team considers that both soft ad hard measures shall be implemented in order to promote private investment in the FCT.

(3) Market Environment

FCT is bordering largely populated states, such as Kaduna and Kano, and the total population of FCT, Kaduna and Kano is close to 25 million (refer to the Table 2.2.2). Based on the interview with the Federal Ministry of Industry Trade and Investment, major necessary materials are transported by trucks from Lagos to the FCT and surrounding cities, or imported, for instance from Niger, by land transportation. The land transportation costs are quite high, and consequently price of the goofs becomes very expensive. Table 2.2.7 shows list of material and goods imported from Niger with their import prices. Food, daily necessaries and consumables are major imported items, and it could be assumed that most of the imported items would be consumed in FCT, Kaduna and Kano because of their proximity to Niger. Therefore, the JICA Study Team recognizes that FCT north, Kaduna, and Kano have the opportunity to produce all the imported items to meet the needs its 25 million people. FCT will be the centre of road and railway networks (refer to Section 6.7), so that FCT should be considered to have higher potential as a logistic centre. The airport located in this area is considered as one of the four major airports (refer to Section 6.4.6), and the airport is highly expected to connect domestic and international destinations as a logistics hub. The JICA Study Team also expects that FCT could aim international markets with opportunities to promote industries to manufacture lightweight and higher-value goods.

Table 2.2.7 Imported Items and Their Prices Transported from Niger to Nigeria

Import Items	Import Value (USD)
Vegetable products	2,009,480
Leather and furs	529,616
Machinery and electrical equipment	161,781
Textile fiber (clothing, accessories)	148,098
Products of chemical industry (soap, detergent, tooth paste)	72,690
Mineral product (stone, cheap material, lime, cement)	60,003
Optical equipment, photographic equipment, measuring equipment, inspection equipment, precision instrument, medical equipment	39,904
Footwear, hat, umbrella, stick	29,682
Plastics and rubber	29,499
Prepared foods, beverages, alcohol, vinegar, tobacco	25,628
Animals and animal products	24,370
Pearls, precious stones, precious metal products	17,284
Miscellaneous goods (furniture, bedding, mattress, bed)	3,840
Vehicles, aircraft, ships and transportation equipment	760
Total import value of Nigeria from Niger	3,152,635

Source : UN Metacode（2017）

2.2.3.3 Undergoing Industrial Development Project

Industrial development projects identified during the survey is summarized hereafter. The following information was compiled based on EPRS (Economic Planning Research and Statistics) materials and brochures of each project.

(1) Abuja Technology Village Project

This is a research and incubation facility development project. The facility is planned to conduct research and development in the fields of biotechnology, ICT, mineral resources and energy technology. The project site is located in the FCC Phase V with the project area of 703 ha, and the project owner is the Abuja Technology Village Free Zone Company. The development of part of the project facilities has started.

(2) Abuja Film Village International Project

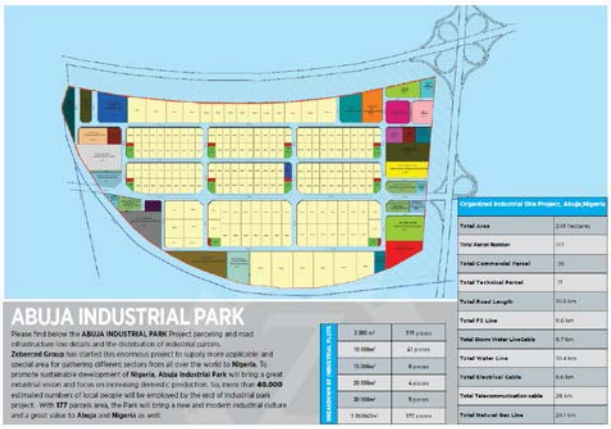
This is a recreational facility project for development of a visual and entertainment centre in the region. This facility development plan also includes residential and commercial facilities. The project targets a site of 6,000 ha in the Kasaki Yanga satellite town, and it is owned by Kohath Investment Group. This project is still under planning stage (as of February 2019).

(3) Abuja Automotive Village Project

This project is to develop a centre of vehicle parts replacement, auto repair shops and driving school. The project site is in Dakwe District, and it has a total development area of 202 ha. The project owner is Auto-Complex Limited, and the first phase of development (80 ha) is underway.

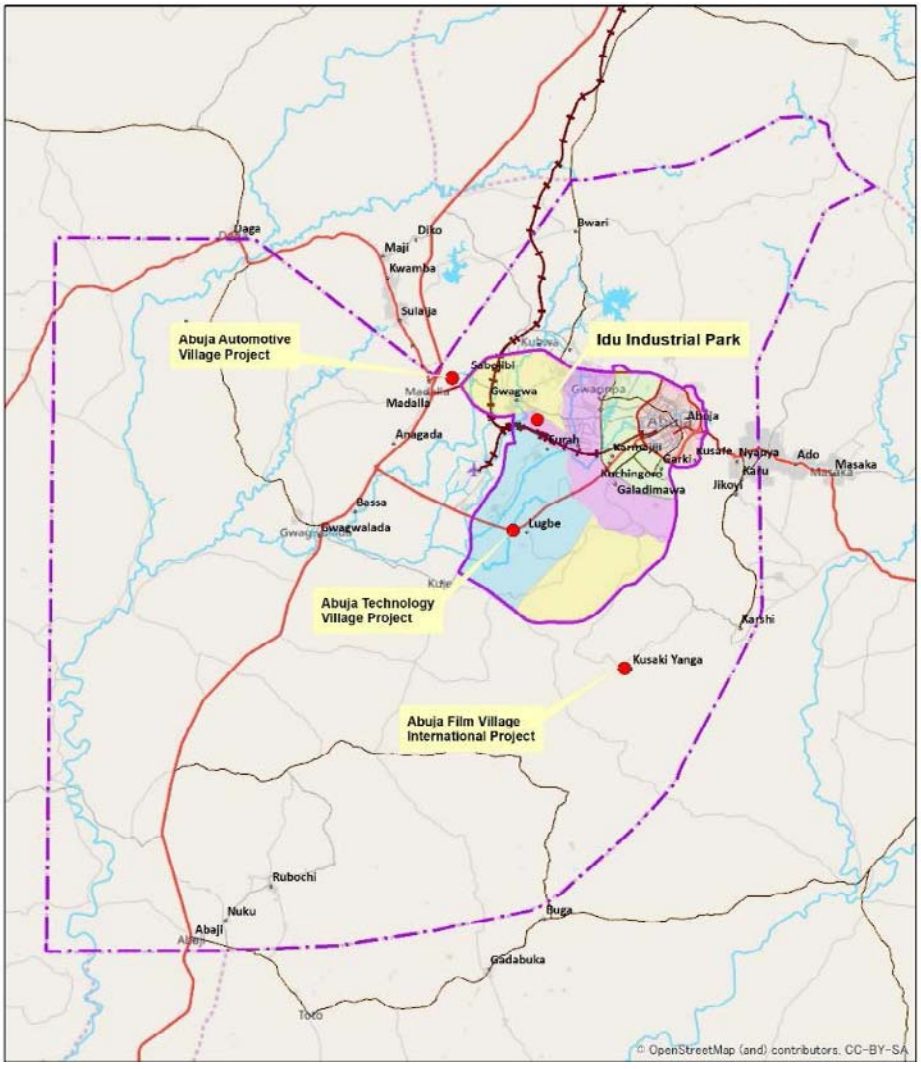
(4) Idu Industrial Park

This is a project to develop a government-authorized industrial park, and the project site with 245 ha development area is in Idu area (there are total 1177 blocks to be tenanted to companies). The project owner is the Zeberced Group. The amount of investment to be made for infrastructure development is approximately 200 million USD. According to the interview with the Zeberced Group, the porject is under planning stage as of February 2019, and the types of industry to be tenanted out are also under consideration.



Source: Brochure of Idu Industrial Park

Figure 2.2.4 Project Concept of Idu Industrial Park



Source: JICA Study Team

Figure 2.2.5 Location of On-going Industrial Development Projects

2.2.4 Government's Financial Resources (Revenue and Expenditure)

Table 2.2.8 shows budget allocated to major departments of the FCT from 2011 to 2015. As the table confirms, about 70% of budget goes to the FCDA, which is responsible for the infrastructure development in the FCT. Besides, the budget allocation is also made to the agencies (FCTWB, AGIS, etc.) and Secretariat (Transport, etc.) in FCTA.

Table 2.2.8 Major Departments' Budget in the FCT (Planned Year 2011 through 2015)

	Department	Total	Ratio (%)
1.	Federal Capital Development Authority (FCDA)	1,158,230,319,276	70.4
2.	Transportation Secretariat	293,447,900,000	17.8
3.	Agriculture & Rural Dev. Secretariat	23,859,016,450	1.5
4.	Education Secretariat	80,045,235,840	4.9
5.	Satellite Town Infrastructure	14,445,647,111	0.9
6.	Health & Human Services Secretariat	25,803,000,000	1.6
7.	Abuja Metropolitan Management Council (AMMC)	100,000,000	0.0
8.	Area Council Service Secretariat	2,400,000,000	0.1
9.	Tourism Development	45,750,000,000	2.8
	Grand Total	1,644,081,118,677	100

Source: Roadmap to Federal Capital Territory's Future, 2011

2.2.5 Other Socio-Economic Indicators

In order to understand the socio-economic development of the FCT, socio-economic indicators of Nigeria, FCT and three states with top most populated are summarized in Table 2.2.1.

Table 2.2.9 Socio-economic Indicators for Nigeria all, FCT and Top Three Most Populated States

Item	Nigeria all	FCT	Kano	Lagos	Kaduna
Capital	Abuja	Abuja	Kano	Ikeja	Kaduna
Languages	Over 250 ethnic groups, large languages	English, Hausa, Igbo, Yoruba	English, Hausa, Igbo, Yoruba	English, Hausa, Igbo, Yoruba	English, Hausa, Igbo, Yoruba
Population(people)	193,392,500	3,095,118	13,076,900	12,550,600	8,252,400
GDP (PPP)(billion dollars)	262	5	12	91	10
GDP per capita ($)	1,153	3,285	1,288	4,333	1,666
Unemployment rate (%)	23	21	21	8	30
Literacy rate (%)	67	79	38	96	47
Infant mortality rate for birth 1,000	61	59	50	24	116

Source: National Bureau of Statistics, Nigeria (Census National Population Commission of Nigeria)

・Population：2019 for FCT and 2016 for others *The population of FCT is estimated by JICA study team

・GDP （PPP）：2007

・GDP per capita：2007

・Unemployment rate：2018 for Nigeia all、2011 for other

・Literacy rate：2015 for Nigeia all、2013 for other

・Infant mortality rate for birth 1,000：2013

2.3 Current Land Use Status

The Abuja GIS under FCDA is currently organizing the land use data in the FCC. The GIS of the land use data is organized by city block base instead of land/building base. The land use data are organized by city block base only in some of the areas outside the FCC, and the data are not organized in most of the areas outside the FCC. Accordingly, the current land use was analysed based on the mix of reading Ortho-photo data and actual site visit in the FCT. In order to identify squatter settlement areas, the layout of buildings, progress of city block development, road development, and others, which could be read through the Ortho-photo analysis, are carefully evaluated.

In order to understand properly the actual land use in the FCT, the characteristics of land use in three areas is analysed: areas inside FCC, satellite towns outside the FCC, and other area outside the FCC. Figure 2.3.1 indicates the locations of the squatter settlement within the FCC, and Figure 2.3.2 illustrates the distribution of urbanized areas in the FCT.

2.3.1 Land Use Status within FCC

(1) FCC Phase I

The central area of the FCC Phase I is developed with formal grid city blocks, and there are government buildings, hotels, financial buildings, business district, and others. The area is also planned for high-density development with efficient land use. The area surrounding the central district is developed as a residential area with a mixture of apartment buildings and houses, and each neighbourhood is developed with a school and a hospital. The urban boulevards and district parks are well arranged in the city area so that the urban space has good harmony with buildings and landscape.

Whole FCC Phase I　　Central area of FCC Phase I

Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Picture 2.3.1　Current Condition of FCC Phase I

(2) FCC Phase II and Phase III

The FCC Phase II and Phase III include areas for houses developed through the Mass Housing Scheme (described in Section 5.2, Chapter 5), government housing projects. The residential areas are developed as a mixture of apartment units and individual houses, there are schools and hospitals. However, the social service facilities, such as schools and hospitals, are not enough in the areas developed under the Mass Housing Scheme, according to the interview with the Mass Housing Department.

There are also squatter settlements in the FCC Phase II and Phase III areas. These settlements are different from the unplanned development observed in the satellite towns, and some city blocks are developed with a road network having effective RoW. The squatter settlement areas are occupied by individual housings in general.


Whole FCC Phase Ⅱ and Phase Ⅲ


Apartment house for government workers in FCC Phase Ⅱ

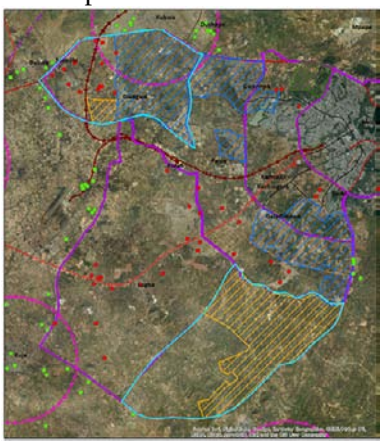

Squatter area in FCC Phase Ⅱ

Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Picture 2.3.2 Current Condition of FCC Phase II and Phase III

(3) FCC Phase IV

There is a residential area developed under the Mass Housing Scheme (described in Section 5.2, Chapter 5) in the north part of the FCC Phase IV. The houses developed under the FCC Phase IV are mainly individual houses. The area was developed by private developers, mainly focusing on the construction of houses under the Mass Housing Scheme, and the social service facilities, such as schools and hospitals, are hardly developed. The southern part of the FCC Phase IV does not have considerable urban area, and most of these areas are undeveloped or considered wasteland.


Whole FCC Phase IV


Northern area of FCC Phase IV


Southern area of FCC Phase IV

Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Picture 2.3.3 Current Condition of FCC Phase IV

(4) FCC Phase V

Part of this area of this phase is developed by private developers for housing, and there are residential areas. However, the development is still limited in the FCC Phase V, and there are farmlands and undeveloped lands. As shown in Figure 2.3.1, there are many squatter settlements along trunk roads within the FCC Phase V area.


Whole FCC Phase V


Northern area of main road in FCC Phase V


Southern area of main road in FCC Phase V

Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Picture 2.3.4 Current Condition of FCC Phase V

2.3.2 Current Land Use of Satellite Towns outside the FCC

Buwari and Kubwa areas, two of the seven satellite towns (refer to Section 3.4.2), consist of developed and undeveloped blocks. Kuje, Karshi, Dobi and Anagada areas are mostly undeveloped with a high concentration of unplanned houses. Houses are mainly individual houses, and the quality of these houses is very low in the areas not developed as city blocks. According to the interview with the URP, there are schools and hospitals in the satellite towns. However, thy have capacity and quality issues when compared with the overall FCT development, according to UNICEF[10]. Kusaki and Yanga are not even connected to the trunk road network, and urbanization is limited.


City area in Buwari Block arrangement area


City area in Buwari Not block arrangement area


City area in Karshi Not block arrangement area

Source： Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Picture 2.3.5 Current Condition of Outside of FCC (Satellite Towns)

2.3.3 Current Land Use outside of FCC (Other Than Satellite Towns)

Abaji (southwest of FCT) and Gwagwalada (west of north-south trunk road) are among the areas outside the FCC in which city area similar to the satellite towns is expanding. Like Buwari and Kubwaha satellite towns, these areas consist of developed and undeveloped lands, and houses are closely located. The area along the National Highway Route 2, which stretches north to south, is mainly used for agriculture. In addition, the

[10] Source: Internet article of "Visit to Public Primary Schools in Abuja: Kubwa, Bwari LGA"

area along the trunk road is lowland with high development potential, but it is developed in scattered and unplanned way.

Southern area of FCT（Abaji）

Western area of FCT

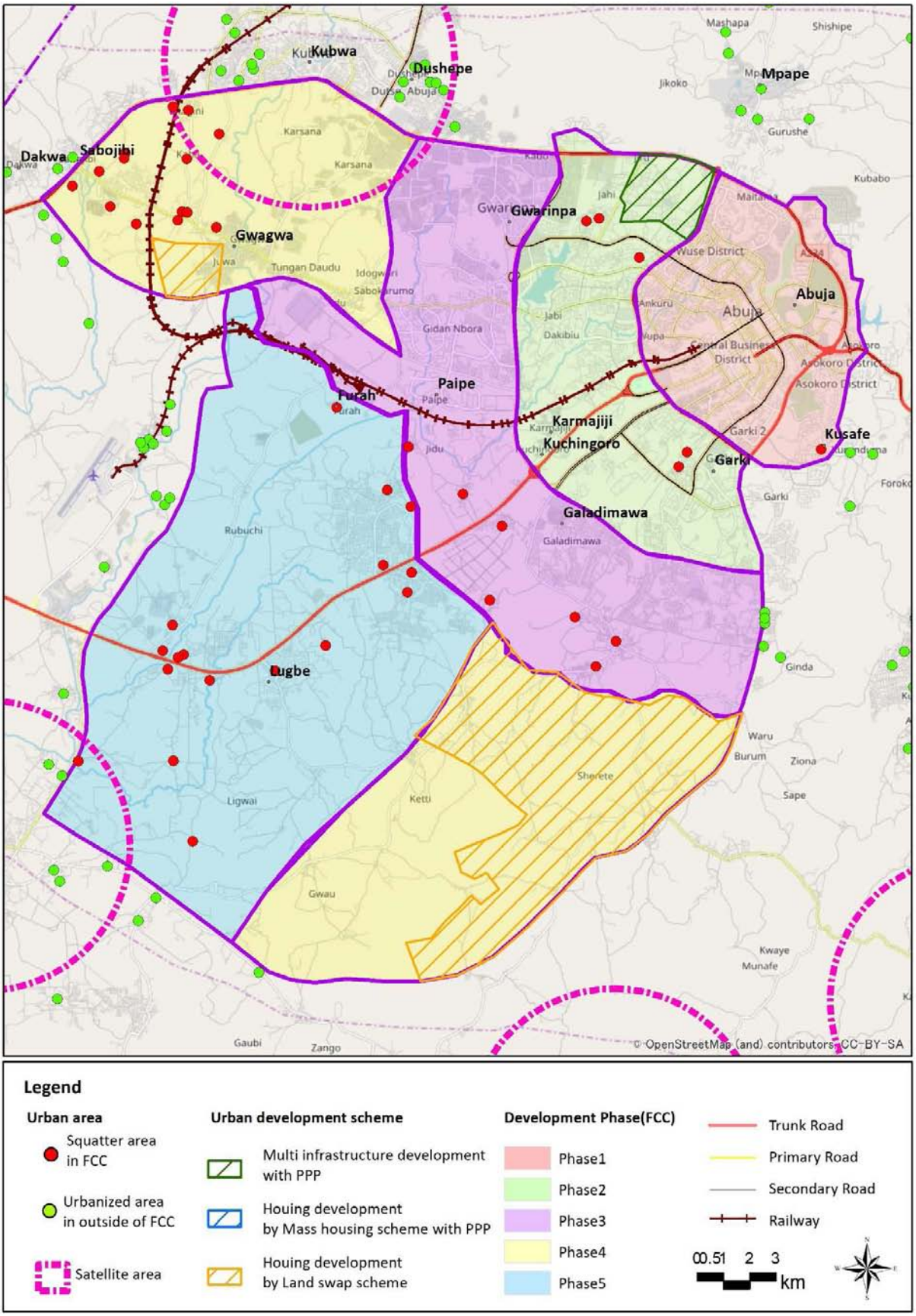
Source： Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Picture 2.3.6 Current Condition Outside of the FCC (Other Than Satellite Towns)

2.3.4 Squatter

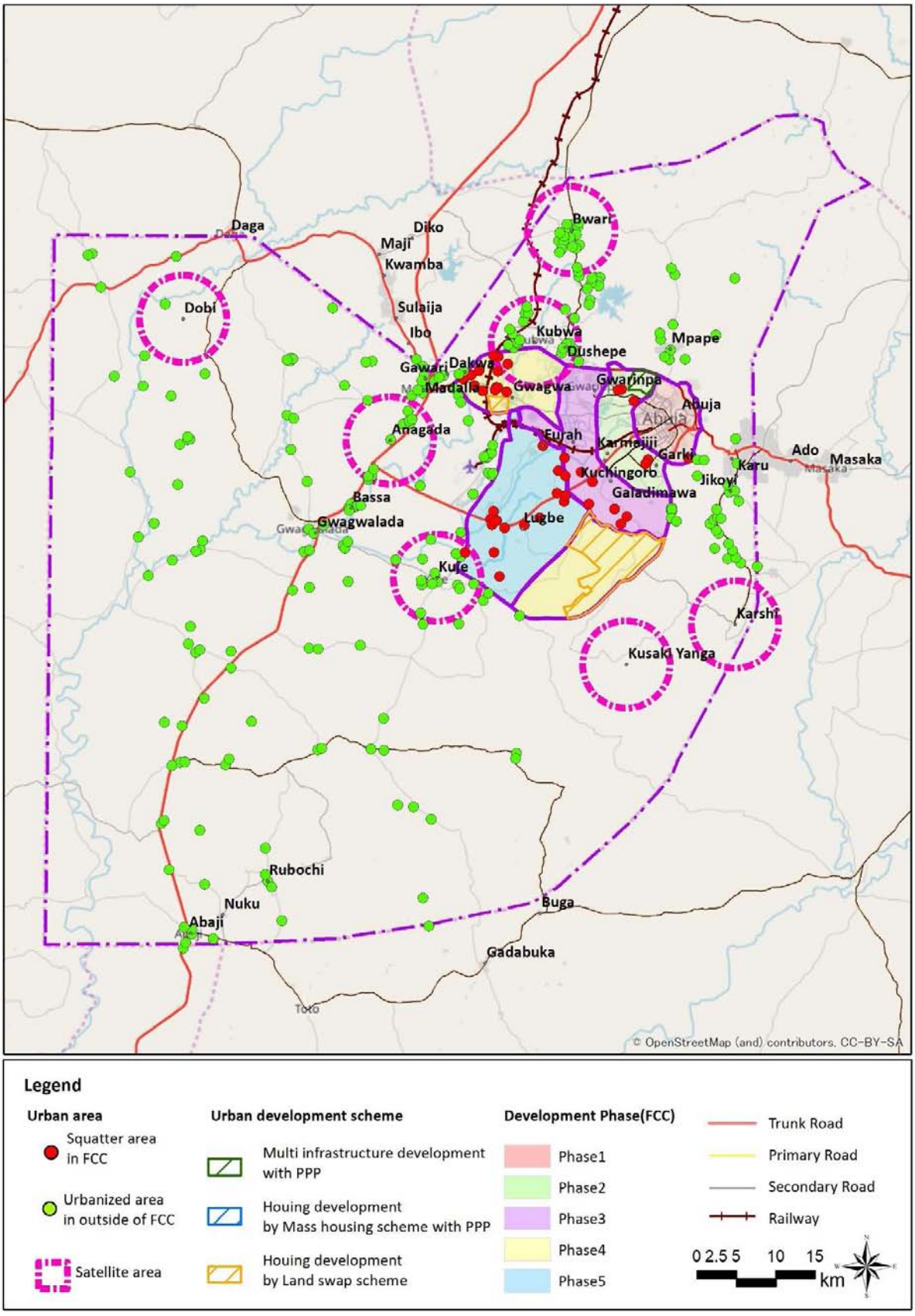
Squatter is a large scale of settlement illegally occupied by people although its land use is appointed. It seems that the squatter is like a slum settlement, i.e. it is crowded, insanitary, and non-safety area where many of people are living inside without basic infrastructures like an electricity and water, since it is mainly shared by low income categories. Almost all similar settlements in the FCC are defined as squatters.

It is usual case that any slum upgrading project would be supported by government and/or international donors since such project needs huge amount of budget. In such cases, NGOs are often assist communities in the slums on certain there environmental negotiation because they are weak due to low income category. For instance, NOGs shall be the side of communities to prevent governments from eviction with legal protection, and to evaluate EIA themselves in case that some risk may occur through negative impact on nature.



Source: Prepared the JICA Study Team
Note: Squatter settlements shown by red dots are identified by the JICA Study Team through Ortho-photo analysis.

Figure 2.3.1 Location of Squatter Settlements in the FCC



Source: JICA Study Team

Note : As the concerned areas are outside of the FCT urban planning area, illegal settlements cannot be clearly identified. Therefore, the JICA Study Team determined the urbanized areas based on the Ortho-photo analysis. Those are shown as light green dots.

Figure 2.3.2 Distribution of Land Use within FCT Urban Area

2.4 Status of Land Ownership

Land Use Act 1978 is the law concerned about the land ownership in Nigeria. All the land in Nigeria is designated as government property. The land in urbanized area is under the control of the Governor of the State, and the land in the rural areas is under the control of the local governments (LGAs).

Right of Occupancy (RoO) shall be obtained from the local government administrating the land, when a government owned land is considered for development use. After obtaining the RoO, the land could be occupied for use for a maximum period of 99 years.

The Abuja GIS under the FCDA is currently organizing the land use data in the FCC. The land use GIS data are organized based on the block level land occupancy of the city. On the other hand, the land occupancy data outside FCC are organized for only residential areas developed based on the urban planning.

2.5 Urban Development Policy and Upper Plan

2.5.1 National Development Strategy

(1) Economic Recovery & Growth Plan 2017 - 2020

In regards to serious economic recession in 2016, Economic Recovery & Growth Plan 2017 – 2020 (hereinafter refereed as “ERGP”) was launched as a middle term development plan in March 2017. The federal government has issued development strategies so far, Vision 2010, Vision 2020, and 2011 Transforming Agenda, for example, however, facing implementation problem. Under such background, ERGP was enhanced on aspect of effective implementation. Different points from past strategies are as followings.

- In order to strengthen implementation function, Infrastructure Delivery Unit, IDU, was planned to establish in 14 ministries / authorities which own heavy infrastructure projects to accelerate Nigeria Integrated Infrastructure Master Plan (hereinafter referred as “NIIMP”), and Infrastructure Delivery Coordination Unit, IDCU, under the Ministry of Budget and National Planning (former National Planning Commission) would monitor and control activities from planning to implementation.
- The plan would be formulated with new initiative more than ever before on priority sectors.
- The ERGP would address innovative action to change relation between the public and private sectors, especially, for agriculture, power, manufacturing, solid minerals, and services.
- ERGP provides for effective collaboration and coordination with the state

The ERGP has 3 strategic objectives to help achieve the vision, 1) restoring growth, 2) investing in people, and 3) building a globally competitive economy. Investment for infrastructure is shown as one of the slogan to achieve the goals, specifically on sectors of power, transport, and telecommunications.

(2) National Development Strategy for each industrial sector

The national development strategies and plans for each sector are as shown below. The details of the plans, which are particularly important, will be explained in Chapter 5 by sector.

Table 2.5.1 National Development Strategy for Each Sector

Sector	Strategy	Summary
Urban Planning	• Nigeria National Housing Policy (1991/2004/2006/2011) • National Urban Development Policy (2014)	• It is a national policy aimed at access to the healthy, safe, hygienic, and affordable housing of all citizens, and "All of the federal, provincial and local governments promote measures to supply housing", "strengthen housing investment measures", "private sector participation "and other policies are indicated. The policy has been revised three times since 1991. • Make Strategy for sustainable urban development. Regulates federally and state-level organizations involved in urban planning at the provincial level.

Sector	Strategy	Summary
Urban Development/PPP	• National Integrated Infrastructure Master Plan (2015)	• A national policy aimed at promoting infrastructure development, which shows transportation, energy, ICT, agriculture, water, mining, housing, social infrastructure development plan, nationwide six regional development plans. • The necessity of participation in the private sector to cover all infrastructure demands and organize the items required for promoting private sector participation by sector
	• National Policy for Public Private Partnership (2011)	• National policy on implementation of PPP projects at the federal level and shows the objectives of the PPP project, the environment required for PPP project implementation, the legal framework, the target sectors, and related federal agencies . • The implementation procedure of the PPP project, value for money in public procurement, business risk in PPP, role of the federal government in implementing PPP project, and so forth.
Urban Transport	• Master Plan for Integrated Transportation Infrastructure (2002) • 25 Year Strategic Vision of the Nigerian Railway System (2002)	• Strengthen consolidation focused on business and economic activities, realize regional and sectoral policies, facilitate facilitation of movement, enhance safety, promote sustainable development and environmental conservation by effectively utilizing existing infrastructure and promoting various multimodal strategies for system maintenance are indicated from both sides of passenger and cargo. • Advance improvements of the existing section tail and new line maintenance. Advance maintenance from narrow gauge to standard gauge, and try to increase the speed of passenger and cargo a lot. Emphasis was placed on maintenance using PPP
Water, Sewage	• National Water Supply and Sanitation Policy (2000) • Water Resources Policy (2004) • Draft National Water Policy (2016)	• Basic policy concepts such as target water absorption rate and basic unit are shown. • Policy on water resources management in Nigeria. • Revised version of Water Resources Policy (2004)
Electric Power, ICT	• National Energy Policy（2003, 2014） • National Energy Master Plan （Draft Revised Edition）2014 • Draft Rural Electrification Strategy & Plan (Revised)	• Eliminate bottlenecks on power supply and ensure maximum utilization of existing supply volume. • Strengthen the necessary transmission and distribution network in order to supply power consumers with reliable and reliable power supply. • Plan to show implementation method and framework of National Energy Policy by 2030, and trends towards industrialization are indicated for energy demand. • Target 75% access to electricity by 2020 and 90% by 2030.
Environment, Waste management	• Draft National Policy on Solid Waste Management (2018) • The Constitution of the Federal Republic of Nigeria 1999 • National Policy on Climate Change and Response Strategy 2011	• Construction of an environmentally conscious ethical solid waste management system. • Increase the value of the nation through protection of the environment, to give top priority to international treaties, to develop domestic laws corresponding to it, to recognize the right of fundamental human rights and preserve a healthy and safe environment for that. • The necessity of prevention and management of climate change risk and natural disasters and describe the consideration of climate change factors in establishing appropriate government organization and sector strategy / policy or plan

Source：JICA Study Team

2.5.2 National Land Use Plan

(1) Laws and Regulations related to Land Use Plan

The laws and regulations concerning the urban and regional development plans are described below along with their outline.

Table 2.5.2 Laws and Regulations related to Land Use Plan

Name of Plan	Summary
The Nigerian Urban and Regional Planning Act 1992	Land use plan formulation and its jurisdiction organization are prescribed
Land Use Act 1990	Land retention provision throughout the country
Forest Law 1956	National Forest Reserve
Federal National Park Service Act 1999	Protected areas such as national resources and wildlife

Source：JICA Study Team

(2) Specific land use plan

The fields to be covered by the specific land use plans include regional development strategies, resource utilization (mineral resources, water resources), and environmental conservation areas. The following table outlines the main land use plan.

Table 2.5.3 Major Land Use Plan

Name of Plan	Summary
Master Plan for national water resource (2013)	It was formulated as the main focus as a revision of the national water resource-related policy formulated in 1995, it has been working on improving access rate to safe drinking water and sanitation facilities, contributing to food self-sufficiency rate of irrigated agriculture, utilization of renewable energy for hydropower application

Source：JICA Study Team

(3) Roles of FCT

In order to realize the Vision 20: 2020 of placing the country among top 20 economies, the roles of the capital city should be as follows:

- Build an efficient and effective administrative framework
- Develop good infrastructure
- Provide quality administrative services to FCT residents
- Create wealth and reduce poverty
- Provide safety and security

2.5.3 Structure of the Upper Plan and Related Plans

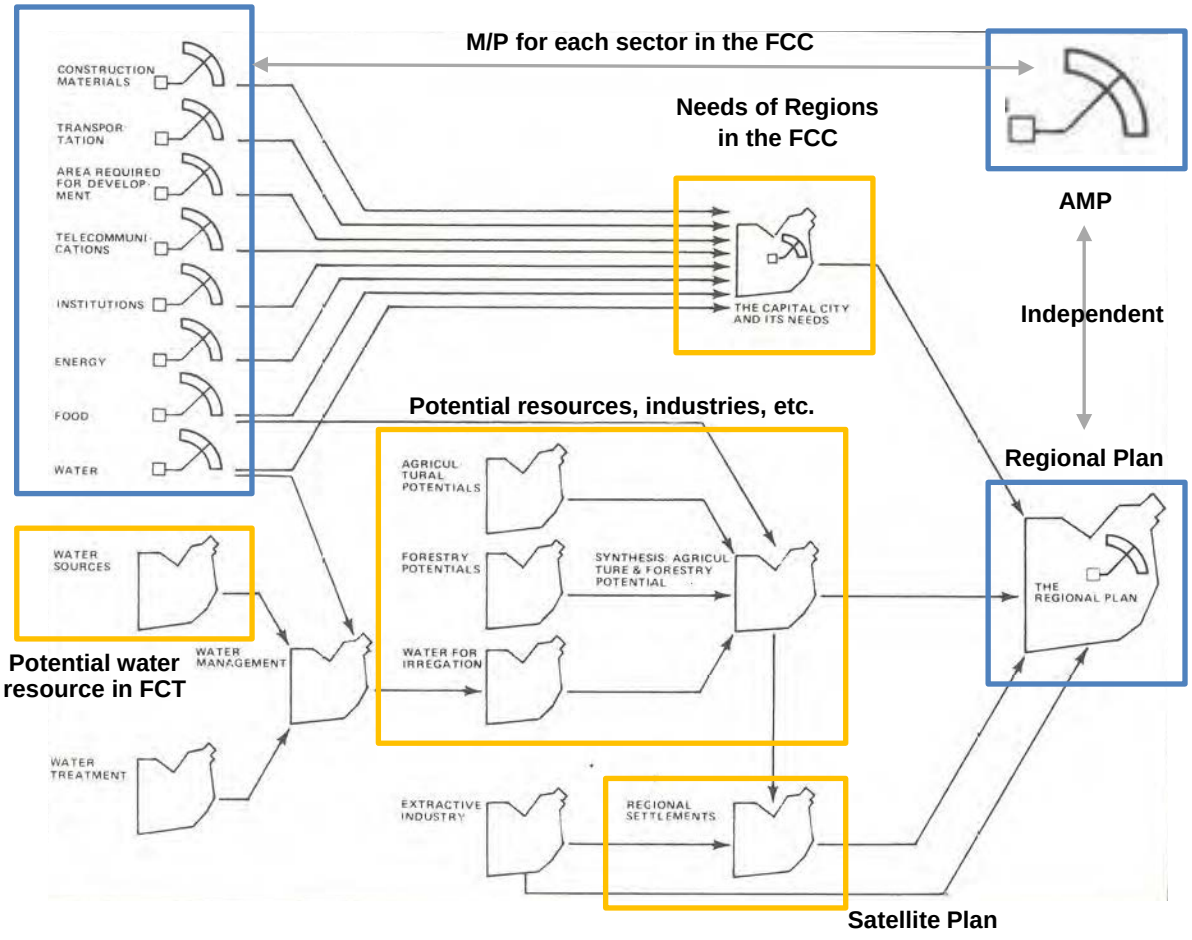
The M/P for each sector related to this is formulated based on the AMP of the FCC, which guides all planning. The development situation, however, varies by sector, and the details are explained in Chapter 5. The Regional Plan is formulated to support activities mainly in the FCC, for example, the water resource, agriculture, forest resource potential required in the FCC were considered with satellite town plans. However, AMP and Regional Plan are not integrated as one plan (Regional Development Plan in chapter 12 of AMP).

Regarding the urban planning, the State (FCT) Urban & Regional Planning Board organizes state level planning, and it formulates various urban planning.

Government	Authority	Type of Plans
Federal	National Planning Commission	Physical Plan, Development Strategy
State, FCT	State Urban & Regional Planning Board	Regional Plan, Sub-regional Plan, Urban Plan
Local	Local Planning Authority	Town Plan, Rural Plan, Subject Plan, Local Plan

Source：National Urban Development Policy

Figure 2.5.1　Organizational Structure of Urban Development Plan for Federal, State and Local Governments



Source：JICA Study Team based on AMP Chapter 12

Figure 2.5.2　Structure of Urban Development Plans in the FCT

2.5.4　Development Policy for Outer Area and FCT Development

(1)　Economic Community of West African States（ECOWAS）

ECOWAS was officially established in 1975 with the aim of improving the economic and living standards of the member countries and political stability through the elimination of tariff barriers, economic cooperation and trade promotion. In 1993, a revised Western African Economic Community Convention was signed in

order to promote further the economic integration and political cooperation among member states. Its headquarters (Commission) is located in Abuja, the capital of Nigeria.

In addition, the West African NEPAD (New Partnership for Africa's Development) was given the executing agency role in May 2002. NEPAD aims at eradicating poverty and sustainable growth and development in Africa, which all African countries are committed to achieve. For realizing the above objects, the development of infrastructure sector, information communication, energy, logistics, water and insurance sanitation should be prioritized; and to this end, projects that promote the development of prioritized fields as well as regional integration should be promoted. The importance of the development of the transportation infrastructure, which is mainly composed of cargoes of roads and railroads, is recognized, particularly for the regional integration. To achieve these goals, it is stated clearly that it can proceed in cooperation with the African Development Bank, the World Bank and other international donor agencies for Nigeria.

(2) New Urban Agenda（Habitat 3）

Upon receiving the 2030 agenda for sustainable development of the United Nations, An action plan for the Promotion of New Urbanism in the 21st Century was established at the 3rd UN Human Settlement Conference (Habitat 3) organized by the United Nations Habitat in October 2016. In September 2018, consultations on implementation programs were made in Abuja. Slum upgrade projects are underway in 30 countries around the world, and Nigeria is one of the target countries. The plan is considered for six Nigerian cities, including Karu, a satellite town adjacent to the FCT. Karu itself is situated in Nasarawa State in the east of the FCT, but Nyanya and Karu have a developed as one town in the vicinity of border between the FCT and Nasarawa State. The upgrade plan consists of three phases: phase 1 for profiling of target cities; phase 2 for action plan and project proposal; and phase 3 for project implementation. Currently Phase 1 is completed, and Phase 2 is in progress, but information on specific project has not been obtained at this stage.

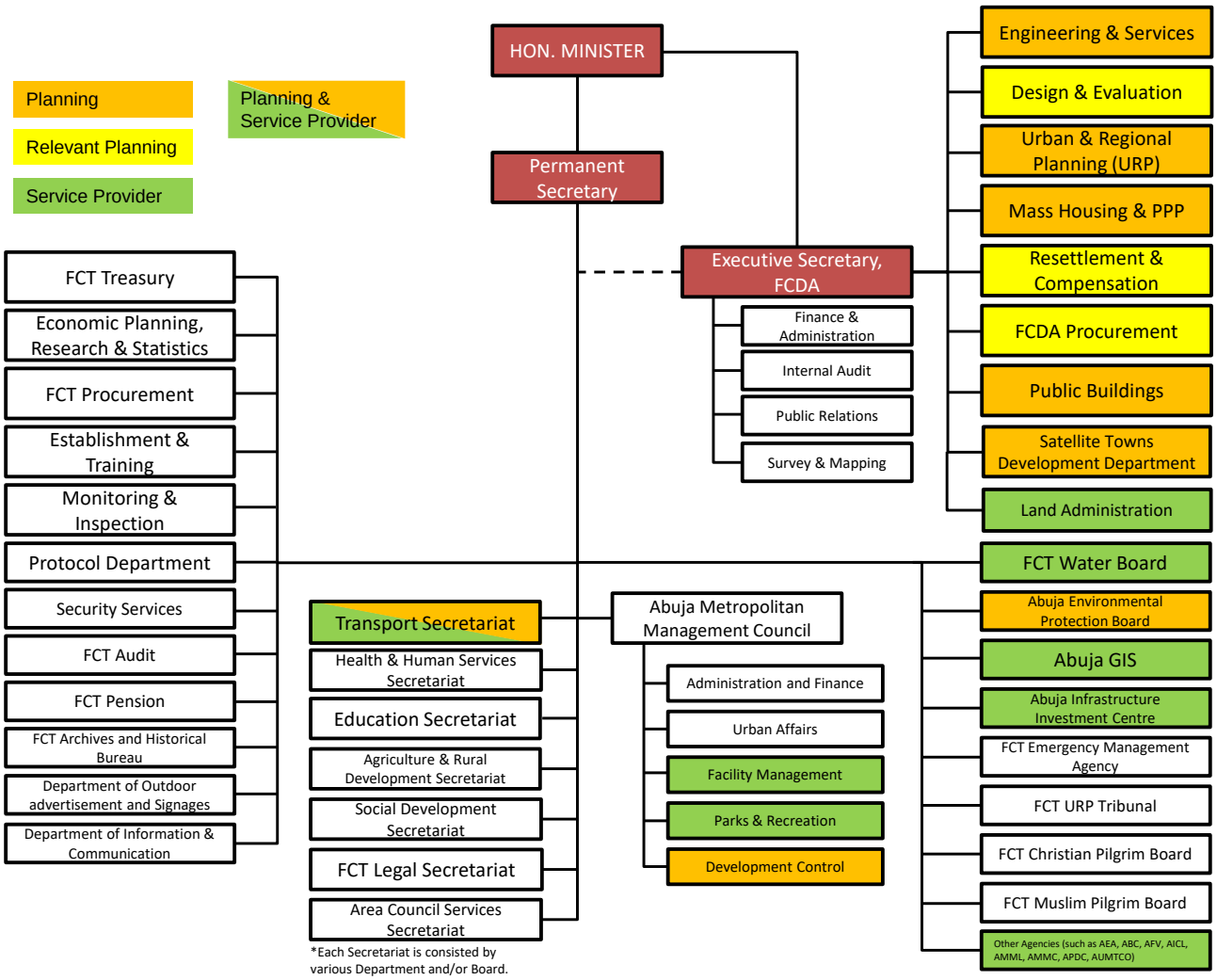
2.6 Implementing Agency Concerning the Development Policy

2.6.1 Executing Agency and Related Organizations

The organogram of FCT is shown in Figure 2.6.1. Under the FCT Minister (equivalent to Governor of State Administration), FCDA (managed by the Executive Secretary, which controls development in the FCC), the development outside FCC was previously independent, Satellite Town Development Authority (STDA), which was merged into the FCDA), implementation and maintenance of infrastructure services, and FCTA (managed by the Permanent Secretary), which mainly deals with administrative services.

FCTA Secretariat is involved in planning activity, although the department belonging to the FCDA that focuses on organizations involved in the development sector policy (sectors where infrastructure planning and public services will be together) depending on the characters of sector. There are also departments that are largely concerned with the establishment of development guidelines and regulations, such as Development Control Department and Abuja Environmental Protection Board (AEPB). The Engineering Services Department of the FCDA is heavily involved in the project implementation. The procurement department of the FCDA is in charge of ordering works, such as construction works. After construction of infrastructure, operation and maintenance works shall be taken over by each appropriate department under the FCTA.

The line departments related to development policy making and implementation, and relevant federal ministries are shown in Table 2.6.1, and detailed section / units under departments in FCDA are shown in Figure 2.6.2.



Source：JICA Nigeria Office

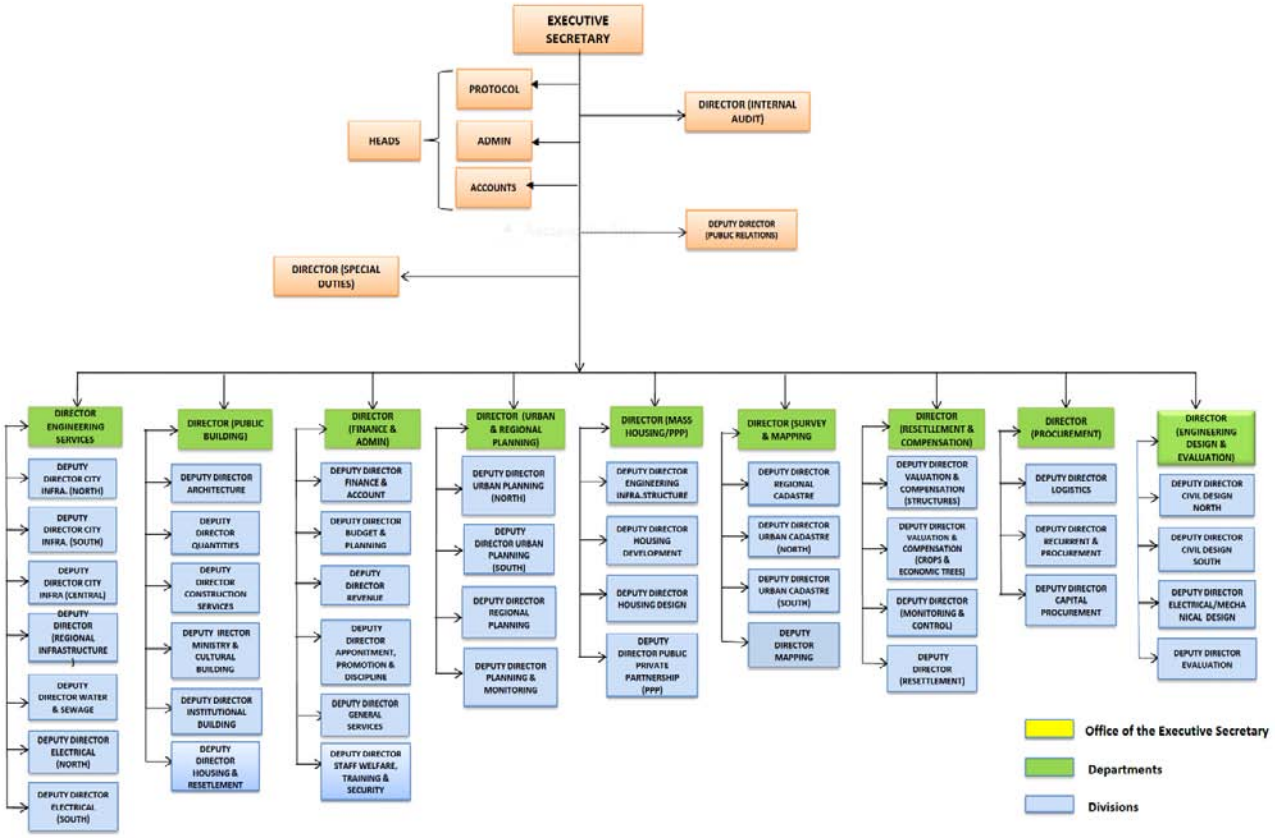
Figure 2.6.1　Implementing Agency concerning the Development Policy

Table 2.6.1　Major Organizations related to the Transport Sector

Organisation		Mandate
FCDA	Engineering and Services	Planning/design, procurement and development of engineering infrastructure/services (roads, water supply, storm and foul sewage, electricity and telecommunications systems) in the FCT
	Design and Evaluation	F Designs of all Engineering Infrastructure in the Federal Capital City, Monitoring and Evaluation of ongoing Engineering projects
	Urban and Regional Planning	Reviewing of the AMP, preparation of detailed plans, change of the land use plan, and preparation of engineering design (infrastructure design) consistent with the land use
	Mass Housing/PPP	Developing the FCT housing policies and regulations, coordination of private and public sector operators involved in Mass Housing Projects in the FCT, implementation of PPP projects
	Resettlement and Compensation	Policy formulation, guidelines and implementation of resettlement schemes, implementation of resettlement programmes, and payment of compensation
	FCDA Procurement	Processing all procurement from all departments of FCDA
	Public Building	Development of public buildings and housing in the FCT (designs, evaluation, costing and production of tender documents and supervises construction works)

	Satellite Towns Development	Work towards the development of the satellite towns/rural/relocation/resettlement areas through the provision of infrastructure, solid waste management in satellite towns and area councils
	Land Administration	Receiving and evaluation of application for urban development projects, issuance of certificate of occupancy
FCTA	FCT Water Board	Operation and maintenance of the water supply facilities in the FCT constructed by the Department of Engineering and Services, FCDA
	Abuja Environmental Protection Board	Operation and maintenance of the sewage facilities FCDA ⁄) Engineering and Services in the FCC constructed by the Department of Engineering and Services, FCDA, approval of the installation of septic tanks in the non-sewered areas of the FCC and technical direction to their users in installation of the septic tanks, and solid waste management in the FCC
	Abuja GIS	land registration and collecting registration fee, digitalizing the information of landowners and integrating land use maps
	Abuja Infrastructure Investment Centre	Promotion of private investment including PPP in the FCT, giving advice for preparing required documents such as OBC, and implementation of Land Swap Initiative
	Facility Management	Maintenance of roads in the FCC and trunk roads connection to satellite towns, and management of street lighting and drainage
	Parks and Recreation	Development/management of park resources and recreational site, reclaimation of green areas and vegetation control
	Development Control	Coordination of development projects, and issuance of permissions for both development projects (e.g. housing development) and individual constructions, based on a development guideline
	Transport Secretariat	Conceptual planning for road network, planning and design for all kind of transport infrastructure and services except road infrastructure, regulations and permissions for transport business and operation
	Abuja Urban Mass Transit Company	Bus operation company with high capacity buses in the FCT
Federal level Organisations	Federal Ministry of Transportation	Development of federal transport master plan. Any Lows, policies, and regulations on transportation
	Federal Ministry of Power, Works and Housing	Planning, implementation, and operation & maintenance for federal roads Policy making of electric power supply for whole Nigeria
	Transmission Company of Nigeria	Planning, operation, and maintenance of power distribution in whole Nigeria
	Federal Housing Authority	Planning and implementation of housing supply for whole Nigeria
	Federal Ministry of Water Resources	Planning and regulation for water resource protection and development in whole Nigeria
	Federal Ministry of Environment	Administration of environmental protection, policy making of protection for environment and natural resources, regulation of environmental standards, evaluation and approval for environmental impact assessment
	Federal Road Safety Corps	All kind of road safety issues, education, and awareness in whole Nigeria
	Nigerian Railway Corporation	Operation of intercity railway including FCT
	National Union of Road Transport Workers	Licence issue for public transportation services and regulations for road transportation business

Source：JICA Study Team



Source：JICA Nigeria Office

Figure 2.6.2 Details of Departments in the FCDA

There is a big skill gap between upper level managers and lower level staff members of the FCDA. According to interviews, it appears that the staff members engaged in practical level works also do not understand basic issues. As part of the education for junior staff members, overseas training held by other donors including JICA has contributes in building the capacity. Young urban traffic administrators from all over the world, including young staff members of the URP of the FCDA, participated in urban transport seminars held in Tokyo in December 2018.

The ICRC and other institutions hold a workshop on PPP every year, and the Association for Consulting Engineering in Nigeria regularly organizes training on infrastructure design, project management, FIDIC etc. Although such trainings may be considered for capacity building, their contents, needs, degree of utilization and effectiveness should be confirmed in future surveys.

It is important to build the capacity of you staff members on urban development. For that basis, capacity that case study of maintenance utilizing advanced technology or actual case of TOD is requested. However, more detailed needs assessment for the capacity is required in the future.

2.6.2 Organizational Human Resources

(1) Members of the Organization

Although the entire organization of FCDA and FCTA is large, there is a mismatch between the number of staff required and the actual number. In particular, concerning difficulties on implementation stage, it seems that the tendency is much serious for department related to operation and maintenance than the one of planning.

Therefore, there is a concern of counterpart shortage to accept project-based experts dispatched by donors in near future in case of proceeding technical cooperation project.

(2) Coordination over the Department

The organization has been subdivided, and the connection among the sub-organizations is weak. There are also departments with overlapping duties, and there are also cases where their mutual demands are not clear. In addition, the organization structure is changed frequently, and there are cases where there are people who are not aware of the change.

(3) Disadvantage on Top-down Decision System

Decisions on important matters are made on top-down basis in the FCT, and the issues that could not be solved at the Director or Deputy Director Level will be transferred through a time-consuming process to the vice minister or Minister.

(4) Budget Management

According to the interviews with each organization under the FCDA, there are mainly implementation issues rather than planning. The issues are caused by budget constraints, and the federal government allocates the required budget through a time-consuming process. As a result, it was pointed out that projects are suspended by the contractors due to payment delays.

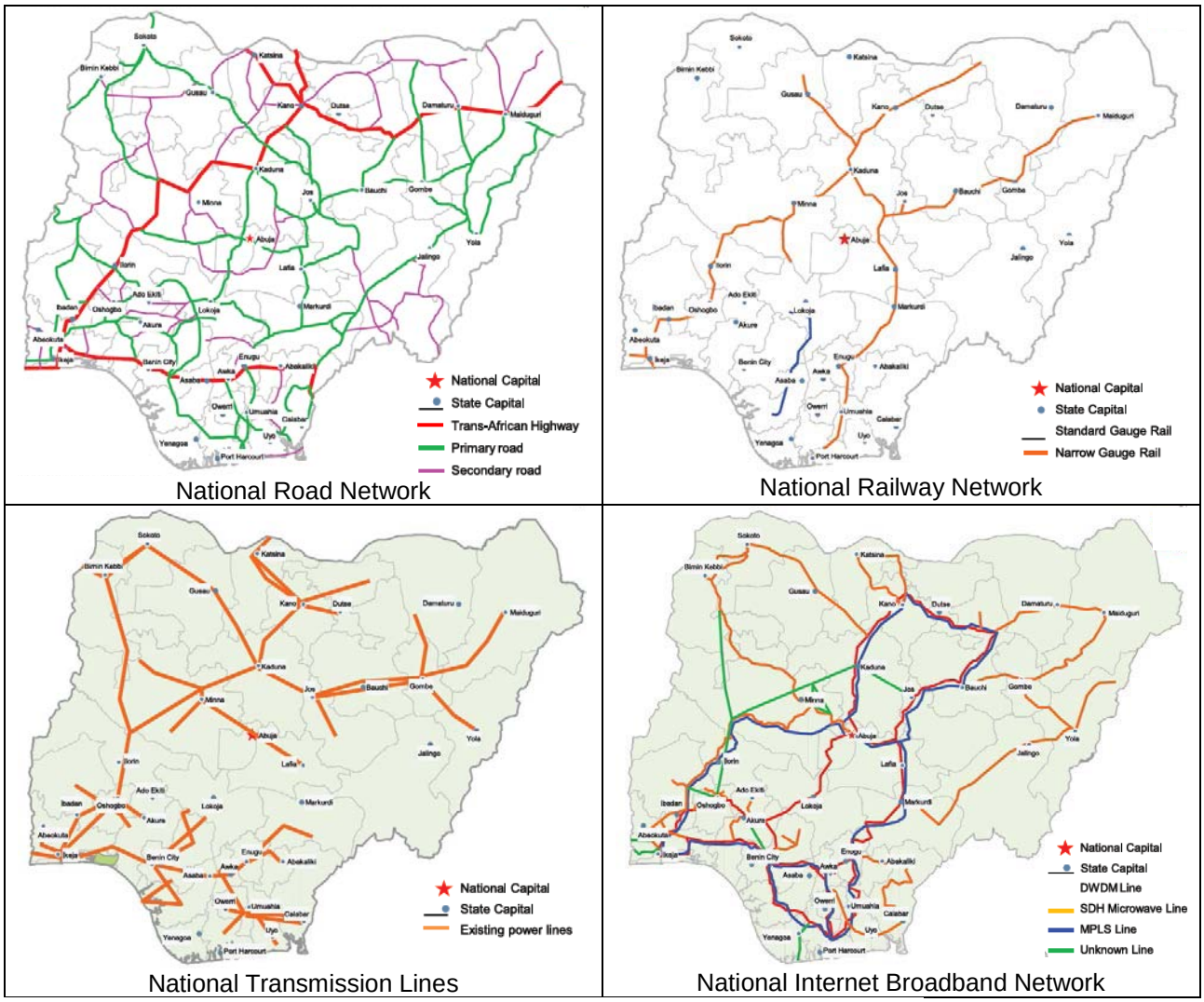
2.7 Federal Nation Structure and Interference to Local Government

Since Nigeria's governance structure is a federal system, the state governments have significant authority. Nevertheless, cooperation with the Federal Ministries is necessary for infrastructure development. While sectoral policies are formulated at national level, there are also state level policies and plans including the FCT. Therefore, infrastructure development in the FCT may be affected the national level priority. In particular, network oriented infrastructures, i.e. roads, railways, power supply, and ICT, change of priority in improvement of existing facilities, change of method in operation and maintenance of facilities by PPP would affect the infrastructure development in the FCT. The “National Integrated Infrastructure Master Plan (NIIMP)" formulated by the National Planning Commission could affect the urban and infrastructure development in the FCT. NIIMP identifies priority projects by sector, and the same is true for the FCT (see Table 2.7.1). Figure 2.7.1shows the situation of network development of different relevant sectors at nation level.

Table 2.7.1 Priority Projects by Sector in NIIMP (Roads, Railways, Power Supply and ICT)

Sector	Priory project
Roads	• Repair and expansion of national highway network (including double tracking of main route and general repair) • Repair and expansion of the regional road network
Railways	• Repairing of existing railway lines • Building additional railway lines
Power Supply	• Implementing gas and hydro-power station projects • Extending transmission lines
ICT	• Expanding the mobile network • Expanding the fibre-optic network • Increasing internet access by creating public access venues and universal access centres

Source: National Planning Commission, “National Integrated Infrastructure Master Plan”, March 2015



Source: National Planning Commission, "National Integrated Infrastructure Master Plan", March 2015

Figure 2.7.1 National Network for Roads, Railways, Power Supply and ICT

Housing development is also a field that requires collaboration with federal agencies. The Federal Housing Authority (FHA) is promoting housing development to reduce housing deficits throughout the country. FHA also targets the FCT area, and it has plans for the development of new towns in the satellite towns. FHA has implemented housing development in Gwarinpa II District, FCC Phase III of FCC, but the development did not meet the FCDA's standards (source: Zaliha'U Ahmed, "Building a New Capital City: The Master Plan Concept, Status of Implementation and Challenges").

2.8 Other Donors' Activities

The projects implemented by other donors in the FCC are organized and details of each project will be explained in each chapter of the relevant sector. Regarding policies relating to the renewal of the AMP by other donors, basically, no donors has the overall involvement of remodelling work and movement to take initiative.

The FCDA has carried out a review in the past on its own, and it has the intention to organize international conference like that if the 1999 for the review. Therefore, the support from each donor is centred on the response of each field or infrastructure (in some cases, comprehensive infrastructure bundling multiple infrastructures). However, consultation and coordination among donors is important for specifying the role of each donor after updating the AMP.

Table 2.8.1 Support Status of Other Donors in the FCC and FCT

Name of donor	Object Area	Object Sector
AfDB	FCC & Nasarawa state (Masaka) FCC & Satellite towns	• Transport (BRT): Cost of pilot project is 950 thousand USD, total cost for phase 1 is 158 million USD. • Abuja Integrated Urban Infrastructure Project
World Bank	No area in FCT	• SSATP is developing (a policy and ability reinforcement to affect a transportation sector) for the whole land of Africa. The plan for five years for 2015-2019 is carrying out now. The concrete activity in Nigeria in particular is not seen.
UNHABITAT	Nasarawa state, Karu area	• Urban development (slum upgrading)
UNEP	No area in FCT （whole Africa）	• Backed by the importance of the waste management plan for the whole land of Africa, the guidance and the guidelines that it is for the African countries where management plans by the local unit are not yet enough, are under making.
DFID	No area in FCT	• Sanitation maintenance, education, water service, micro finance, poverty reduction, electricity, agriculture and so on in other states. But ability development is the heart except a part. • Ability development such as the budget management for government.
AFD	FCT FCC & Nasarawa state (Masaka)	• Abuja power supply scheme transmission project • Transport (BRT) AfDB syndicated loan is planning: 50 million USD for phase 1 project
China	FCC & satellite towns	• Transport (Railway): 834 million USD for civil works, and 194 million USD for rolling stocks of Lot 1 – 3.

Source: JICA Study Team

2.9 Outline of Community Organizations and NGOs

2.9.1 Outline of Community Organizations

Community organizations known as Community Based Organization (CBO) are established in various locations of Nigeria. In a survey conducted in Osun Province in 2009, it was found that 50 to 100 CBOs exist in each area, and each CBO has about 10 to 100 members. Generally, CBOs are based on areas, but some of them are based on affiliation, such as religious or political affiliation. Furthermore, while there are area based CBOs organized by volunteers, there are CBOs established for specific purpose and organized by experts.

The common activities of CBO are the maintenance and improvement of the basic infrastructure in respective CBO area. The basic infrastructures are community roads, common faucets, clinics, schools, community centres and markets.

CBO members themselves are may provide funds for such infrastructure development and improvement projects; however, the CBOs also receive funds from NGOs, government (federal, state) and international donors as community development support program.

The Nigerian Urban and Regional Planning Act established in 1992 requires the evaluation and the verification process of a city plan to include a disclosure period in which interested parties my provide their feedback on the draft of the plan. Through this process, CBO representatives may provide their feedback and participate in the city planning.

2.9.2 CBO Participation for Urban Planning Process

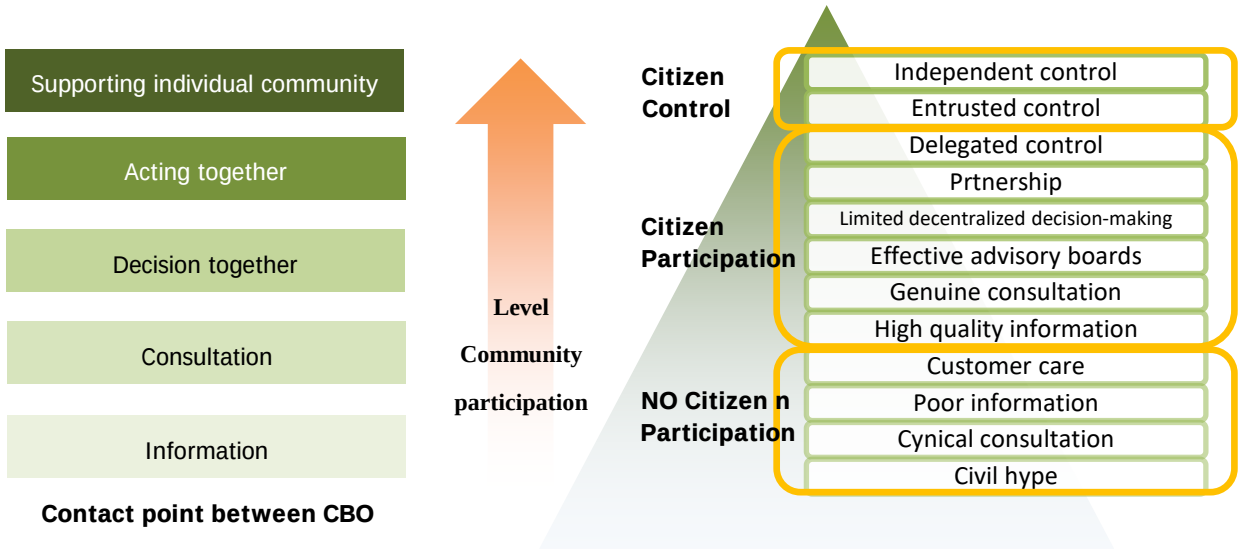
According to Nigerian Urban and Regional Planning Act in 1992, it is clearly mentioned that public comments from those who are interested in evaluation for urban planning and opinion collection during public

announcement are necessary. It seems that participation on behalf of CBOs is typical style of public involvement of these public comments collection.

2.9.3 Case Studies on Involvement of CBOs in Individual Projects

In Minna of the Niger State, a trial regional development project involving ethnic groups and area CBOs was carried out in 2009. The contents of this project was summarized by Ahmadu Bello University in Kasuna Province as a research study. The community participation (CBO and NGO) from an early stage of planning of all urban development projects and management is important, since such participation shall raise effects of the project from the viewpoint of receiving benefits themselves. There are many cases, actually, where government side may avoid inconvenient issues for project related to community. Therefore, it is said that CBO participation could make the project good accountability.

The form in which CBOs and NGOs participate in regional development projects is evaluated as the following based on the level of involvement as the following figure shows.



Source：level of residents` participation

Figure2.9.1 Level of Community Participation

Chapter 3 Outline of the Abuja Master Plan, and its Issues

3.1 Existing and former Abuja Master Plans and their Review

3.1.1 The Master Plan for Abuja the New Federal Capital of Nigeria

(1) Outline of Abuja Master Plan (AMP)

The first AMP[12] was formulated in 1979 by the FCDA. The Master plan includes "major elements of the Regional Plan for the Federal Capital Territory"[13]. And it is "designed to provide long-term guidance for the orderly implementation of the New Capital City"[14].

(2) Legal status of AMP

Federal Capital Territory Act, (Laws of the Federation of Nigeria 1990) defines "the preparation of a master-plan for the Capital city and of land use with respect to town and country planning within the rest of the Capital Territory" as FCDA's responsibility (article 4 (1) (b)). And its article (1) (d) stipulates responsibility of FCDA for "the establishment of infrastructural services in accordance with the master-plan referred to above". The word "Master plan" is recognized for its utilization only in the FCA Act and the study team couldn't find in other laws.

"Nigerian Urban and Regional Planning Act", (Decree[15] No.88 1992) provides formulation process of Regional Plan and Urban plan, and their executing process for land development control. Their formulation process will be described in the section 4.1.2 and corresponding administrative entities and legal basis will be described in the section 4.1.1(2) and 4.1.3(2).

(3) Contents of AMP

The AMP consists of following chapters and contents.

Chapter 1 Summary	
Chapter 2 The site for the New Federal Capital City	: The plan determined the location of the Federal Capital City (hereinafter "FCC") and the airport based on the study of the geographical and topographical situation of the Federal Capital Territory (hereinafter "FCT") area.

Figure 3.1.1 Selection of Suitable Site for Urban Development

[12] The Master plan for Abuja The New Federal Capital of Nigeria, FCDA, 1979
[13] ditto
[14] ditto
[15] "Decree" was used for the statutes in the period (ref.:http://www.nigeria-law.org/LFN-1992.htm).

Chapter 3
Population and employment projection

: Study on future geography about resident population and numbers of employment by sector (public, industrial and service) .

The initial plan assumed a population of 1,600,000 in the area in 2000. And the master plan stipulated that the main function of the city is for federal administration. The employment of the area in 2000 was assumed to be composed of public sector (171,300 persons), industrial sector (84,200) and service sector (241,000).

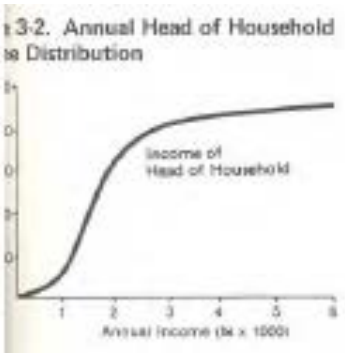


Figure 3.1.2 Study on Households

Chapter 4
Determinants of form

: Urban spatial structure, urban system (e.g. single urban core or plural urban cores), and sub-urban centers are studied. Its results were reflected for the FCC's spatial structures.

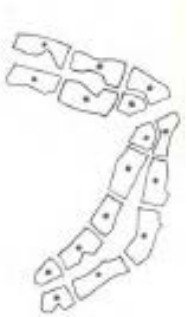


Figure 3.1.3 Comparison of Urban Structure

Chapter 5
Plan organization and land requirements

: Comprehensive land use plan was formulated based on the results of the Chapter 3: Population and employment projection and the Chapter 4: Determination of form

Figure 3.1.4 Comprehensive Land Use Plan of FCC

Chapter 6
The central area plan

: Detail plan, development capacity, land use plan and spatial design principles of FCC are formulated.

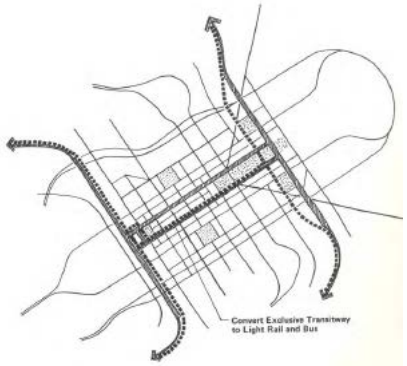


Figure 3.1.5 Study on Spatial Model of CBD

Chapter 7
Sector organization

: Principles of spatial composition and arrangement of public facilities were studied.

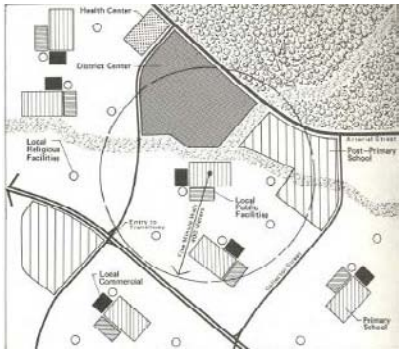


Figure 3.1.6 District Development, Neighbourhood District Model

Chapter 8
Public services

: Planning principles of arrangement of public service facilities (e.g. school, cultural facilities, fire station and police station) and their capacities were studied and stipulated.

Figure 3.1.7 Conceptual Plan of Public Facilities' Arrangement

Chapter 9
Transportation system

: Transportation system such as transportation model of FCT, traffic capacity, public transportation and alignment of highway was studied.

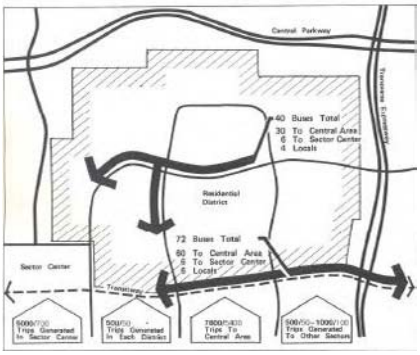


Figure 3.1.8 Study on Transport System of District Level

Chapter 10
Residential

: Housing supply scheme and business model were studied. Housing types corresponding to different household's income groups, their capacities and providing business schemes are examined.

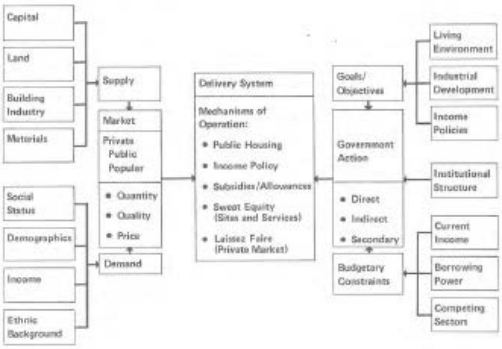


Figure 3.1.9 Study on Housing Supply Scheme

Chapter 11 Support infrastructure system : Study on infrastructure systems.
Water Supply (study on pipeline from water dam to FCC, water supply network in FCC, phasing construction plan)
Sewage (Sewage network in FCC, phasing construction plan, construction of sewage water treatment plant)
Drainage
Solid waste management (Selection of final disposal site)
Energy (Electrical network connection with national network, demand, distribution network in FCC)
Telecommunication (Network in FCC)

Figure 3.1.10 Infrastructure Network (Water Supply)

Chapter 12 Regional development plan : AMP developed the "Regional Development Plan" for the area in the FCT but outside the FCC. The plan estimated the initial population of the area at 300,000. Development in these areas were planned for relocation from FCC for its village residents. However, according to the plan, it is difficult to estimate further migration into the FCT at the stage of planning. Considering the industries in the area, agriculture and forestry industries are assumed as the main economic activities.

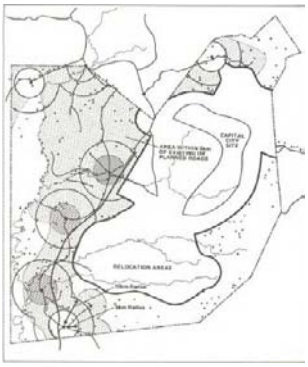


Figure 3.1.11 Regional Development Plan

Chapter 13 Implementation : AMP studied implementation plan until 1986. The plan examined work force for construction, required construction materials to be prepared, urban development control system based on provision of permission.

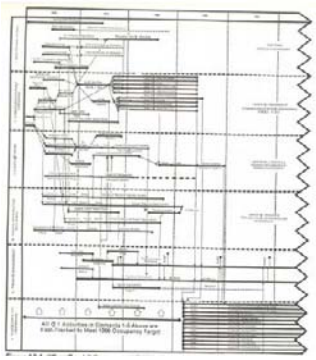


Figure 3.1.12 Implementation Plan

3.1.2 Central Area Urban Design of Abuja

Based on the AMP, the detail design[16] of the central area of FCC was formulated by Kenzo Tange and URTEC in 1981. The plan stipulated following matters:

- Fundamental design principles for the building lots
- Principles for landscape formulation
- Design standard of road intersections in the central area of FCC.

[16] Central Area Urban Design of Abuja, the New Capital City, Kenzo Tange & URTEC, Detail spatial design for central area of FCC Phase I

3.1.3 Regional Plan

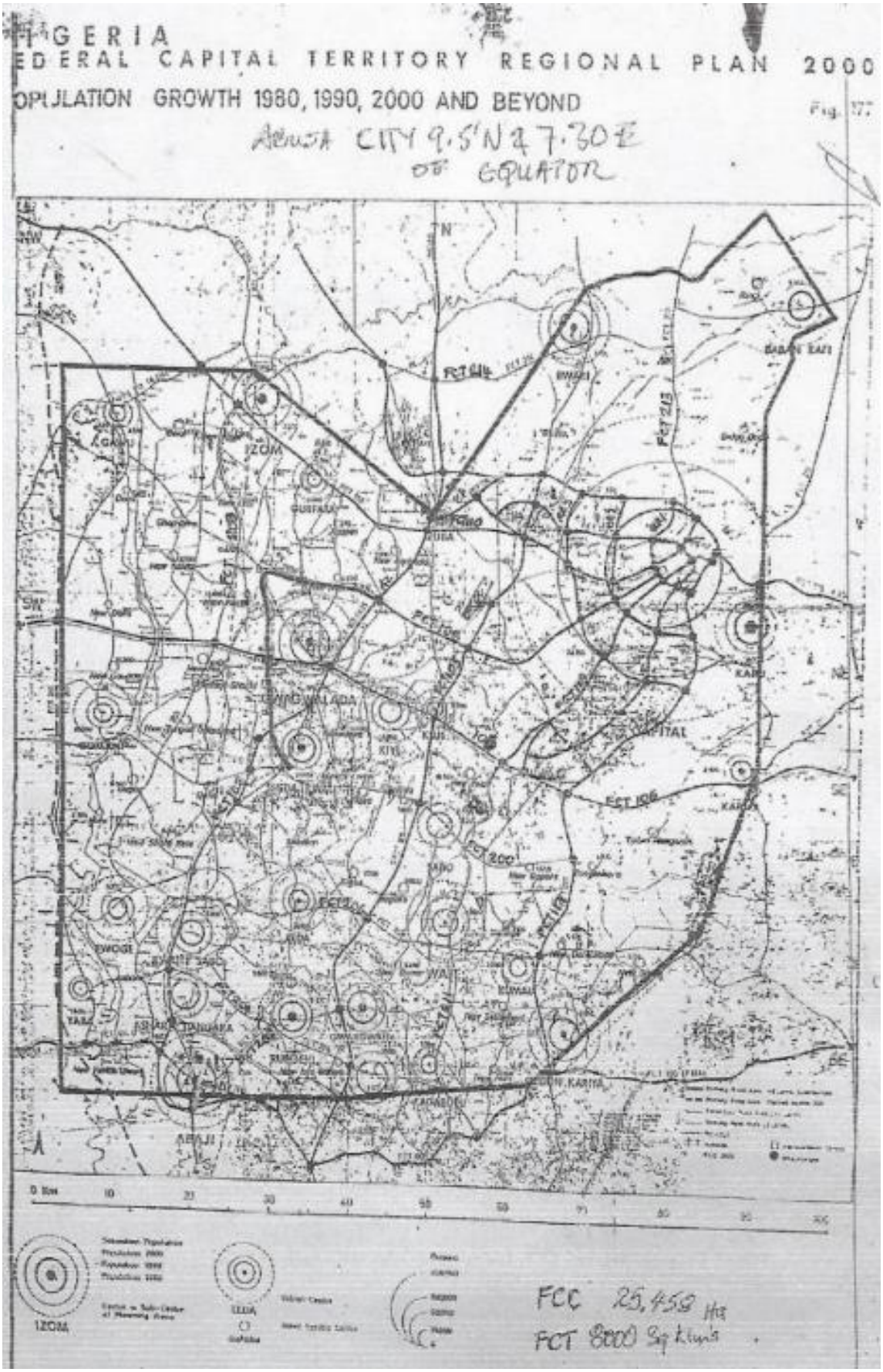
Based on the AMP, the detail plans of the regional development plan[17] were formulated by Doxiadis and associates in 1983. The plan designates fundamental satellite towns, their locations and estimated population. As a result, a principal road network of arterial roads connecting the satellite towns was planned.

It is assumed that the AMP estimated the population of each satellite towns. However, relevant agencies (including URP of the FCDA) could not provide the original report of the plan, and the relating documents when requested for reference during the study period, from January to February, 2019. It was, therefore, necessary to search the official document archives to know the present situation of the document. The relevant regional plan documents found and obtained at present are as follows:

1） Distribution map of the satellite towns (Figure 3.1.1)
2） Planning drawing of the land use (Figure 3.1.2)

The study team couldn't confirm the current status of the comprehensive regional plan during the study period. It is assumed that the parts of plan of the selected areas were partially revised and referred for implementation based on the above-mentioned limited plans and results of review and upgrading planning for prior satellite towns (ref. section 3.4.2).

[17] The Regional Development Plan, Doxiadis Associates Doxiadis Associates consultants, 1983



Source: FCDA, Planning of the Regional Plan Document (obtained as photo image under approval)

Figure 3.1.1 Distribution Map of Satellite Towns in the Regional Plan

Source: FCDA, edited by AGIS in later years

Figure 3.1.2 Planning Drawing of the Land Use of the Regional Area

3.1.4 Relating Infrastructure Plans of AMP

Relating infrastructure plans of AMP are as follows.

Table 3.1.1 Relating Infrastructure Plans of AMP

Sector	Title of plan
Transport	Urban Transport Study of the New Capital City Abuja. 1981 Review of Urban Transportation Study and Transportation Mater Plan, under revision
Water supply Sewage Drainage	Abuja Water Master Plan, modified in 1980 / 2008 Planning Study & Preliminary Engineering Design of Sanitary Sewer System for the New Federal Capital City, 1980
Solid waste management	Report of the Committee on the Development of Comprehensive Road Map for Effective Solid Waste Management in the FCT, 2016

Source: JICA Study Team

3.2 Review of AMP

The International Conference on the Review of the Abuja Master Plan was help by FCDA in 1999 and highlighted some “differences” between the plan and the actual situation[18]. The major differences are as follows:

[18] Adeponle B.J, The Integrated City as a Tool for Sustainable Development Abuja Master Plan, Journal of Educational and Social Research, 2013

1） The plan of resettling all the existing inhabitants had to be revised. Furthermore, as resettlement with compensation is restricted to the site required for the planned construction and development, existing settlements turned to be slums of lower-rank government employees and low-income residents.
2） The "Accelerated District" was developed for low-income workers to prevent the emergence of shanty towns of construction workers in the periphery of the capital city. Meanwhile, the plan was also to serve as a model for testing out the detailed land use plan concepts. As a result, areas (writer's supplement: out of FCC) like Nyanya, Lugbe turned out to be the main receivers of the population influx into the FCT.
3） The present Official Residence of the President has usurped the site meant for the National Monument, which makes it impossible for Abuja to feature the beauty and grandeur from such buildings
4） As geo-political biases became prominent in staffing of the FCDA, distortions became common both in the allocation of building plots and in the distribution of allottees (writer's supplement: it is thought that it implies adequate intervention by officials).
5） This delay in the construction of public transportation has caused disorderly and illegal occupation of the planned site. This will also cause great difficulty in the future for the development of the transit network for buses and eventually a rapid rail system.
6） The open space featuring the concept of Parkway is gradually being used for construction and physical development in FCC Phase I and II.
7） In the development of Green Areas/Hill Tops for Housing, layout changes have been observed. As a result, most of lands reserved for green space are occupied for residential development.

3.3 Planning Activities after the Review of AMP

The 1999 International Conference recommended the necessity of urgent review of the AMP and periodic review in every five years[19].

With this understanding, the review of the master plan started in 2002. The review focused on the following issues and areas.

3.3.1 Planning Corresponding to the Review of AMP

(1) Review of the Abuja Central Area (AS&P, 2007)

The Master Plan of Abuja Central Area was reviewed from 2005 to 2007[20]. In order to answer to the trend of the urban development, the object of the plan is to build a 24-hours city, with introduction of mixed use development, improvement of footpath network and on-street parking lots.

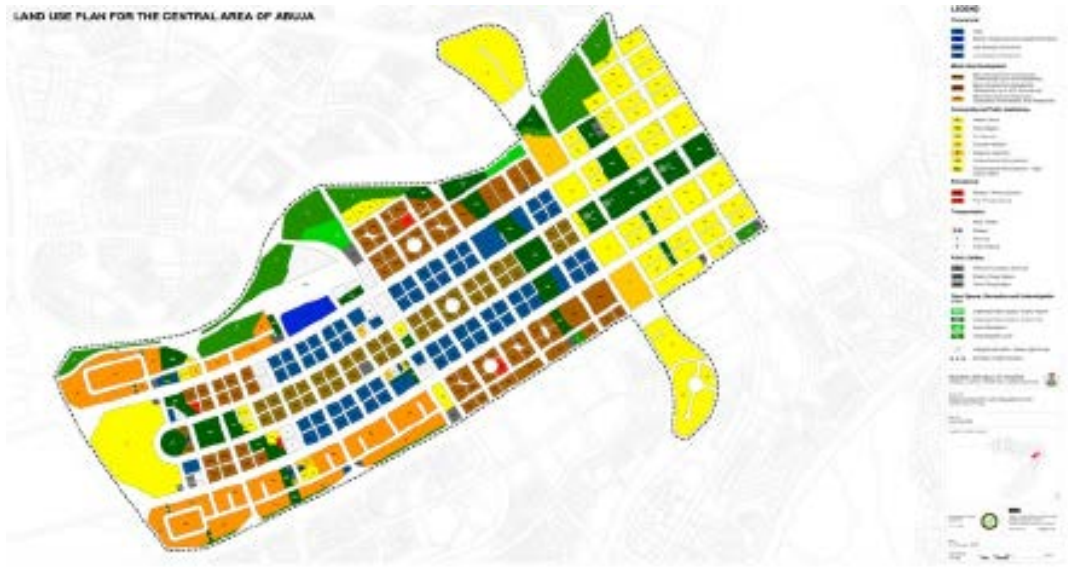
The following items are typical proposals in this plan:

- Change of the development density (by setting up the minimum development capacity, etc.)
- Moderation of the demand for parking areas
- Provision of on-street parking spaces
- Rebuilding railway stations
- Introduction of footpath in commercial areas
- Changing the features of some roads
- Reviewing the regulations of public investment utilization in CBD areas
- Introduction of small-size blocks (division of large-scale sites)
- Proposals of establishing organizations for the management of public facilities
- Landscape formation along the National Mall Road

[19] Zaliha'u Ahmedn, Building a New Capital City
[20] Revised Development Control Regulations for the Central area of Abuja, AS&P, Development Control Department, 2008

Source: Review of the Abuja Central Area (AS&P, 2007)

Figure 3.3.1 Review of the Abuja Central Area (1)



Source: Review of the Abuja Central Area (AS&P, 2007)

Figure 3.3.2 Review of the Abuja Central Area (2)

(2) Transportation Context Studies (AS&P, 2007)

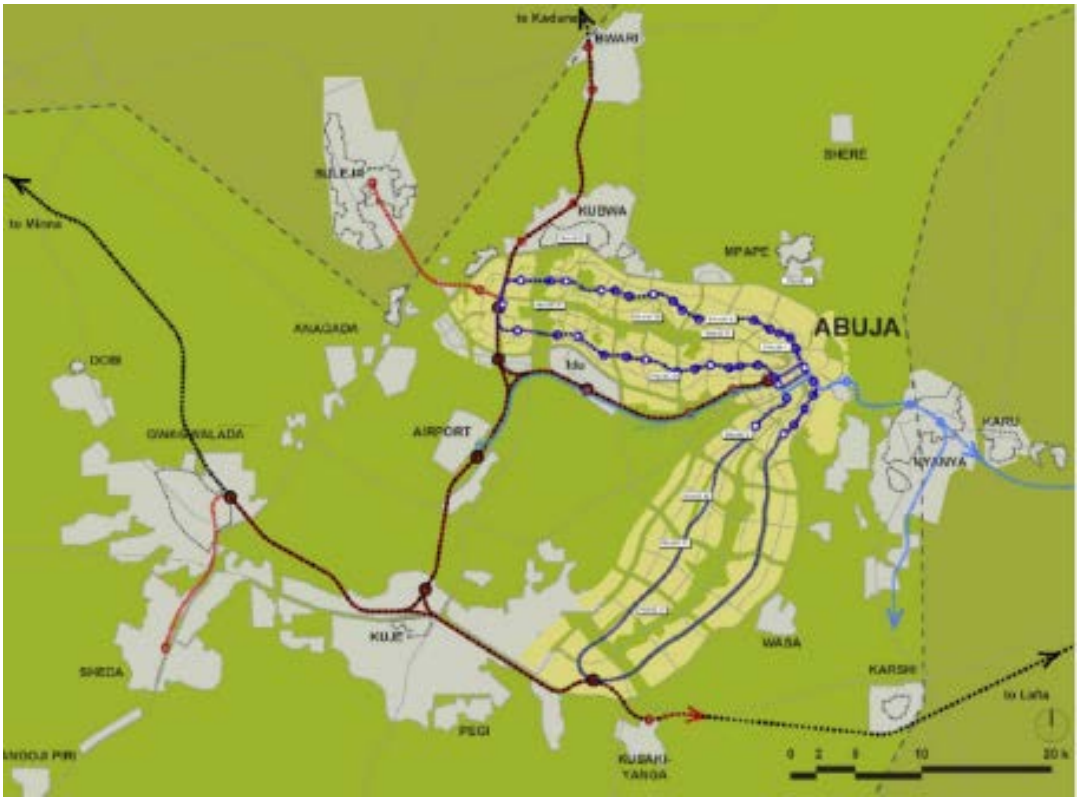
The Abuja transportation system was reviewed in the period of 2003–2007[21]. The reviewed plan included proposals for the Modernization of the National Railway (construction of new and extension of lines, and upgrading to the standard gauge) and expansion of the development area of Abuja Mass Transit System (MTS).

In this plan, the construction of transit lines in FCT was proposed in order to smoothen the commuting between the suburban area and the Central Area.

The study intended to secure various transport access network for commuters in the satellite towns between FCC, traffic management measures for huge traffic volumes in FCC, and smooth accessibility between airport and FCC with following proposals.

- Construction of commuting railway between FCC and satellite towns
- Construction of intercity railway to be constructed as extension of commuting railway
- MTS in FCC

[21] Abuja Developments, Prime Tech, AS&P, Julius Berger



Source: Transportation Context Studies (AS&P, 2007)

Figure 3.3.3 Transportation Context Studies

(3) Master Plan for FCC Phase IV North (AS&P)[22]

The urbanization in the northern part of FCC is rapidly progressing. At the same time, a growth of illegal settlements is also observed in the same area. It is assumed that this distorted development was led by existence of the old arterial road A234, which connected Keffi-Abuja and passed through the area, and the earlier completion of construction of the new A234 than upgrading of the Airport road and construction of arterial roads in the Southern FCC.

To deal with the problem, decentralization of the residential areas in the FCC was planned based on the planning system of satellite towns. Furthermore, this plan intended to be the model plan for other developers.

The plan was formulated to be applied to sites of 12,000 hectares. Meanwhile, the concept of the mass transit proposed in the AMP was also planned to be implemented.

[22] Master Plan for Abuja North Phase IV-West, AS&P, 2008

Source: Master Plan for FCC Phase IV North (AS&P)

Figure 3.3.4 Master Plan for FCC Phase IV North

(4) Master Plan for FCC Phase IV South (EDRES Consultants)[23]

The area enclosed by the Inner Southern Expressway, Outer Southern Expressway and Southern Parkway was designated for urban development and its plan was studied and formulated.

This plan is also a target of the Land Swap Initiative, which is under discussion for implementation. Land Swap Initiative for the details of this initiative is described in the Section 5.2.1 (4).

[23] FCC Phase IV District Development, FCT Minister, 2012

Source: FCC Phase IV South (EDRES Consultants)

Figure 3.3.5 Master Plan for FCC Phase IV South

(5) Master Plan for FCC Phase V (EDRES consultant)

The site of the FCC Phase V is located at the outer part of the FCC Phase I to IV. The plan was developed in order to avoid the passive influence of the disorderly urbanization in the outer FCC area into the CBD.

Source: FCC Phase V (EDRES consultant)

Figure 3.3.6 Master Plan for FCC Phase V

(6) Review of Abuja Landscape Master Plan (Multi-Systems Consultants)

According to the report prepared by the director of URP, the spatial plan and landscape plan proposed in the AMP were reviewed. The assessment of present situation, and review of the completion of the original plan were also carried out[24].

3.3.2 Progresses after the Review of AMP and Relating Plans

AMP set the planned population of 1,6000,000 persons corresponding and the year 2000 for completion of the FCC phase III[25] development.

Through the series of development plans by review planning processes, the planned population of FCC corresponds 3,000,000, which AMP set as its ultimate population. This increase of planned population corresponds following development of plans and changes.

- The FCC Phase IV and the FCC Phase V developments (ref. 3.3.1 (1) to (6)).
- The other reviewed areas for development of detail planning and change of development density
- Population in the neighboring areas of FCC where AMP didn't planned for urban development

Despite the reviews and plans, the following issues are yet to be resolved:

- The planning activities (after the reviews by the 1999 International Conference on the Review) were executed separately targeting different areas and sectors. Consequently, the results are not integrated into one inclusive master plan which covers the whole FCT.
- The review of the plan of FCC and the Regional plan (plan of FCT) are executed separately. Thus an inclusive review is needed.
- For the regional area, the FCT order No.1, 2004 designated 18 areas as satellite towns, of which 10 are to be developed immediately.

3.4 Relations between Existing Master Plan and Urban Development Activities

This section describes changes and progresses of AMP, which are explained in Section 3.1 to 3.3, the present land use plan, and the progress of urban development. The corresponding progresses of individual sectors will be described separately in Chapter 5 to 9.

3.4.1 FCC

Regarding the FCC plan, the detail land use plan, site development plan and fundamental engineering equipment design (infrastructure design) have been formulated based on the AMP.

The status of the implementation of the detailed plan, which is quoted from the report written in 2017[26], is shown in Figure 3.4.1[27]. The progresses of the preparation of the detail plan or the construction is as follows.

FCC Phase I	80%
FCC Phase II	30%
FCC Phase III	20%
FCC Phase IV	Less than 1%
FCC Phase V	Less than 1%

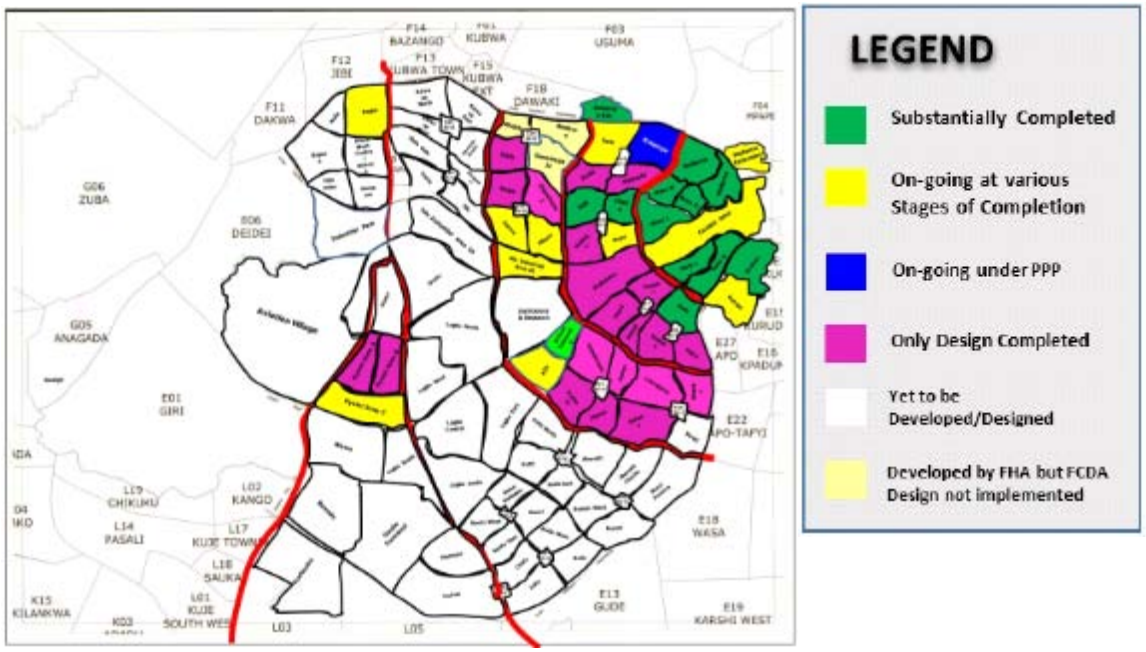
There are still areas to be reviewed by URP even in FCC Phase II and Phase III, which were planned for initial development sites. Meanwhile, FCC Phase IV and Phase V are without any progress, and they require a coordination with the private sector on schemes like Land Swap.

[24] Based on the description in the "Building a New Capital City (Zaliha'u Ahmedn)". Original document has not been obtained during the study period.

[25] AMP set 6 development phases for the current FCC Phase III area

[26] The source doesn't describe year of status for reference, so this document noted the time of description of the source

[27] Zaliha'u Ahmedn, Building a New Capital City, P25



Source: Zaliha'u Ahmedn, Building a New Capital City

Figure 3.4.1 Progress of Infrastructure Planning and Construction

3.4.2 FCT

According to the result of the 1999 conference reviews of the AMP, the FCT Order No.1, 2004[28] was issues, designating 18 satellite towns, of which 10 are selected for immediate developed, as mentioned earlier.

The preparatory works for the individual towns' master plan have been carried out for 7 of the 10 satellite towns by URP.

The 10 satellite towns are listed in Table 3.4.1.

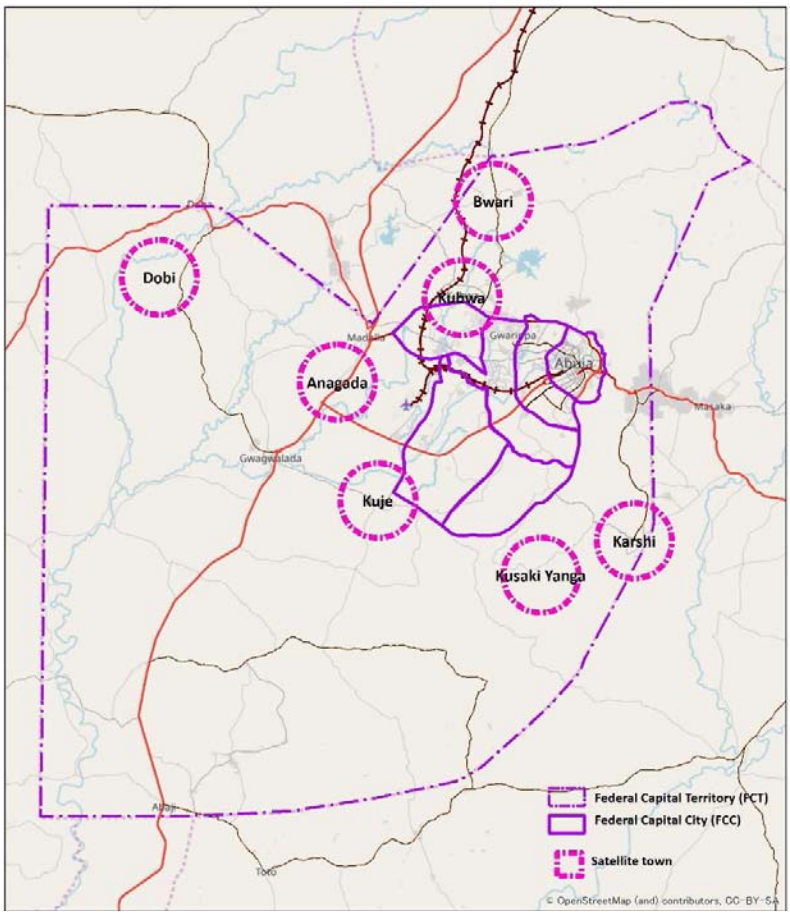
Table 3.4.1 Priority Satellite Towns to be developed

No.	Name	Area Council	Progress of planning works by URP (2017[29])
1	Bwari	BWARI	75%
2	Kubwa	BWARI	69%
3	Karshi	AMAC	76%
4	Kuje	KUJE	On going
5	Kusaki Yanga	KUJE	On going
6	Dobi	GWAGWALADA	On going
7	Anagada	GWAGWALADA	No engineering Design
8	Gosa	(in FCC)	
9	Abuja North West	(in FCC)	
10	Abuja South West	(in FCC)	

Source: JST based on the description in "Building a New Capital City (Zaliha'u Ahmedn)"

[28] The Federal Capital Territory [Establishment of Functionaries Territory (Dissolution)] Order No.1, 2004

[29] The source doesn't describe year of status for reference, so this document noted the time of description of the source

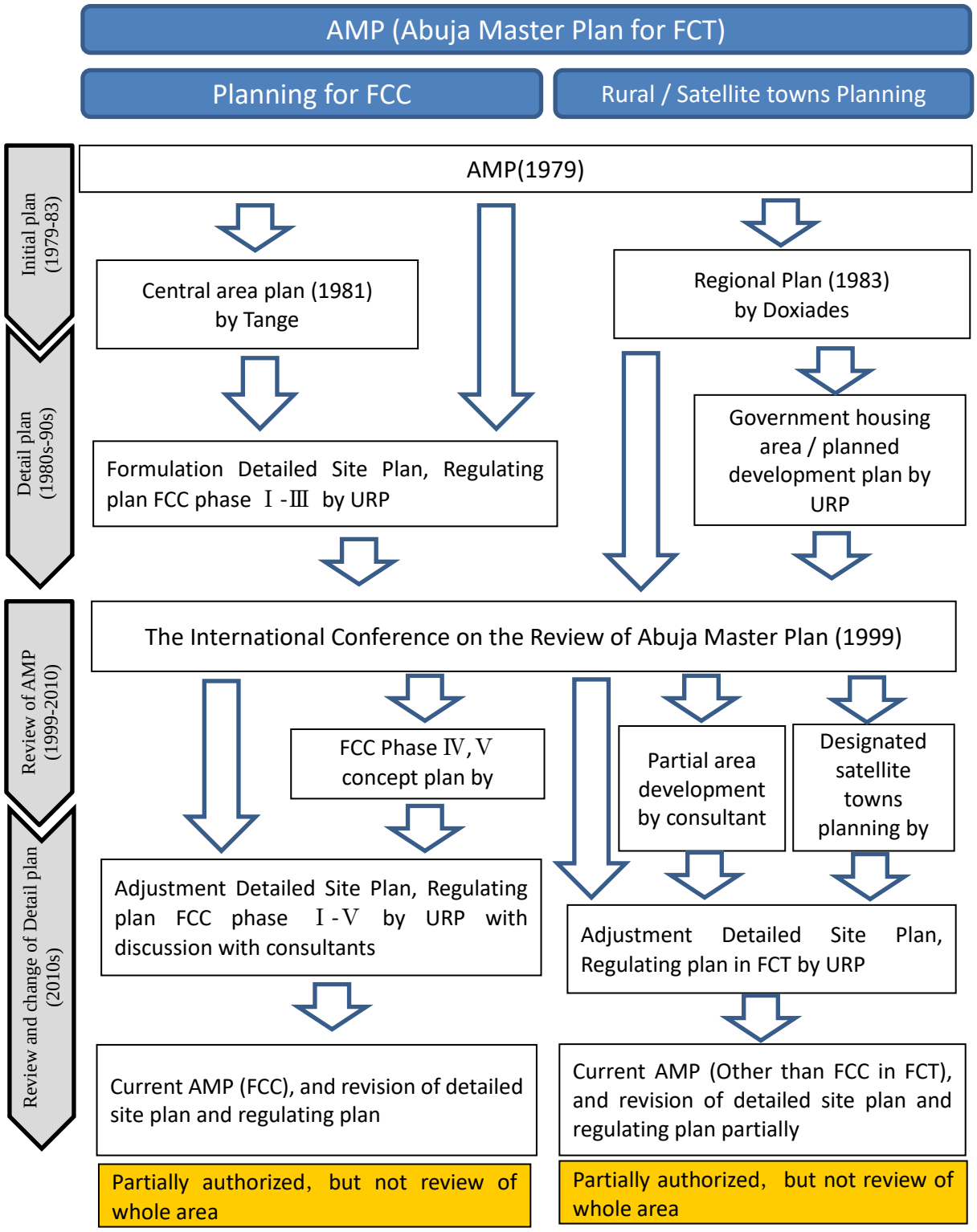


Source: Prepared by the JICA Study Team

Figure 3.4.2 Prior Satellite Towns to be developed

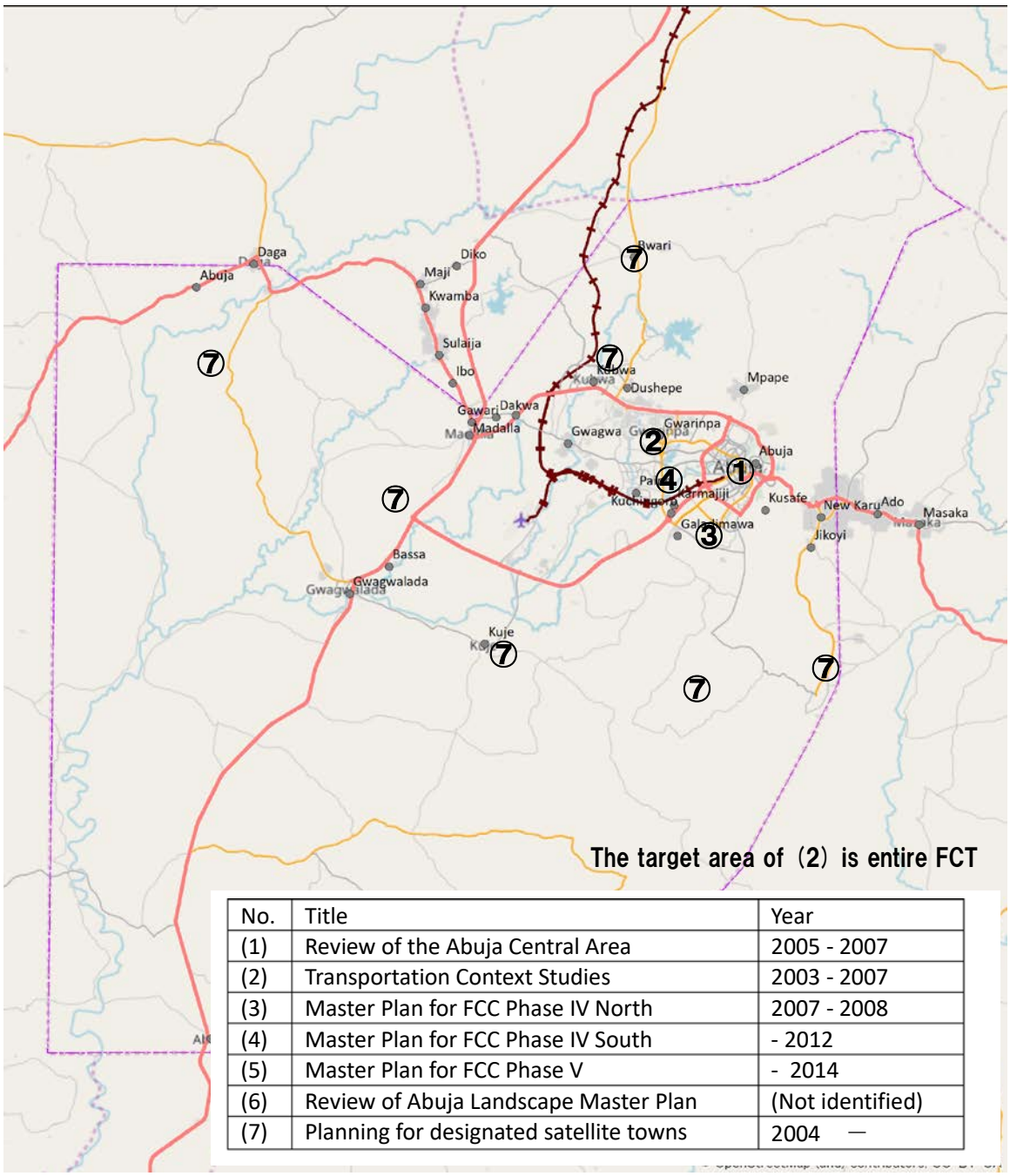
3.5 Process of Review and Upgrade of the AMP and Relating Plans

The review and upgrade process of the AMP and relating plans, which are described in Section 3.1–3.4, are shown in Figure 3.5.1. And Figure 3.5.2 shows planning activities in the process. The reviewing and upgrading process conducted since 1999 could be have integrated the urban plan for FCC and the regional plan for satellite towns and the FCT. However, the urban plan and the regional plan had been separately examined and formulated in the following planning process. Moreover, the reviews mostly focused on the planning of a part of the target areas, and never studied spatial structure including restructuring of the whole FCC, Urban area and Regional area.



Source: JICA Study Team

Figure 3.5.1 Process of Reviewing and Upgrading the AMP



No.	Title	Year
(1)	Review of the Abuja Central Area	2005 - 2007
(2)	Transportation Context Studies	2003 - 2007
(3)	Master Plan for FCC Phase IV North	2007 - 2008
(4)	Master Plan for FCC Phase IV South	- 2012
(5)	Master Plan for FCC Phase V	- 2014
(6)	Review of Abuja Landscape Master Plan	(Not identified)
(7)	Planning for designated satellite towns	2004 —

Source: JICA Study Team

Figure 3.5.1 Planning Activities in the Review and Upgrade Process of the AMP

3.6 Issues observed in the Development of Detail Plans and Implementation of AMP

Figure 3.6.1shows issues observed in the development of detail plans and implementation of AMP, which were described in Section 3.1 to 3.4.

The AMP of 1979 formulated the urban development policy and basic plans (basic plan for land use in 4), basic plan for infrastructure design in 5), and basic plan for urban development project in 6)). For the realization and the implementation of the AMP, it is important to develop detailed plan[30] for land use for securing land use control, and detailed plan for infrastructure design (sectorial plan). [31] As the corresponding plan,

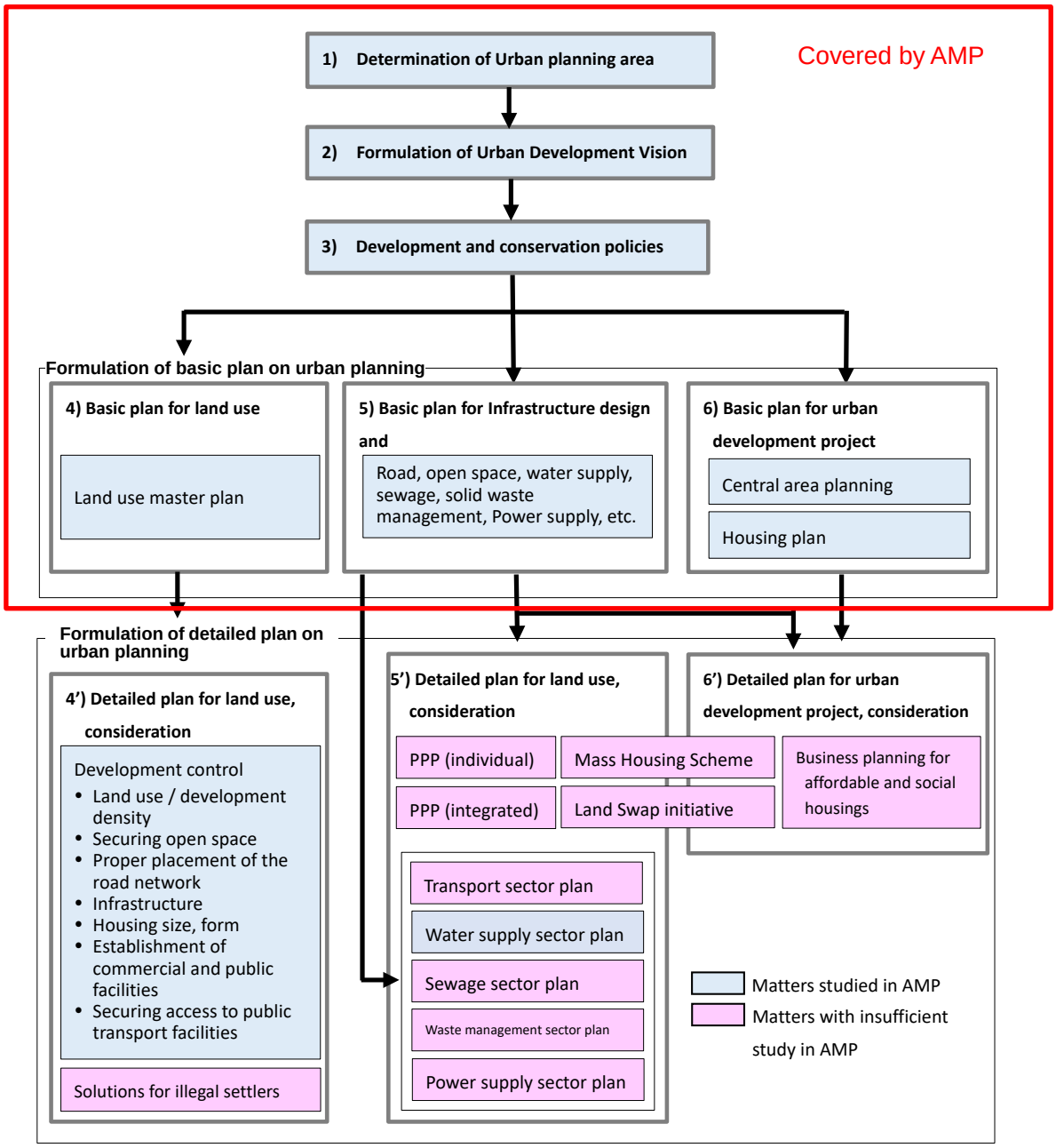
[30] Prescribed in the Nigerian Urban and Regional Planning Act (ref. 3.1.1 (2))
[31] Prescribed in the FCT Act (ref. 3.1.1 (2))

development control manual to manage land use and water supply plan were formulated planned in accordance with the AMP. Even monitoring, evaluation, adjustment and feedback processes and schemes are defined in laws, but these working process were not addressed for the unpredicted and inevitable urban situations sufficiently and effectively (ref. 3.3, 3.5 4.1.2).

The initial AMP did not consider the possibility of illegal settlement and unbalanced social composition of residents in neighbourhood areas. As a result, the AMP could not introduce alternative plans, such as construction and promotion of affordable housing, land readjustment project, and urban redevelopment. Moreover, there are few chances to apply development methods that had not been designated in the AMP.

In addition, it is notable that the delay of urban developments and low-density urbanization directly causes insufficient infrastructure development.

Because of the above considerations, the study team suggests the importance and necessity of regular monitoring, adjustment and upgrading of the master plan.



Source: JICA Study Team

Note : In the figure, PPP (individual, integrated), Mass Housing Scheme, Land Swap Initiative were classified in « the matters with insufficient study in AMP » because their implementation had not been established and prepared at the formulation of the AMP.

Figure 3.6.1 Planning Process of AMP, Detail Plans and Implementation Plans, and Their Issues

Chapter 4 Urban Planning

4.1 Urban Planning System and Its Implementation System

4.1.1 Entities Related to Urban Planning and Their Authority

The land use planning of FCC and FCT, and the issuing of permission about land use is undertaken by the following organizations.

(1) Department of Urban and Regional Planning (URP)

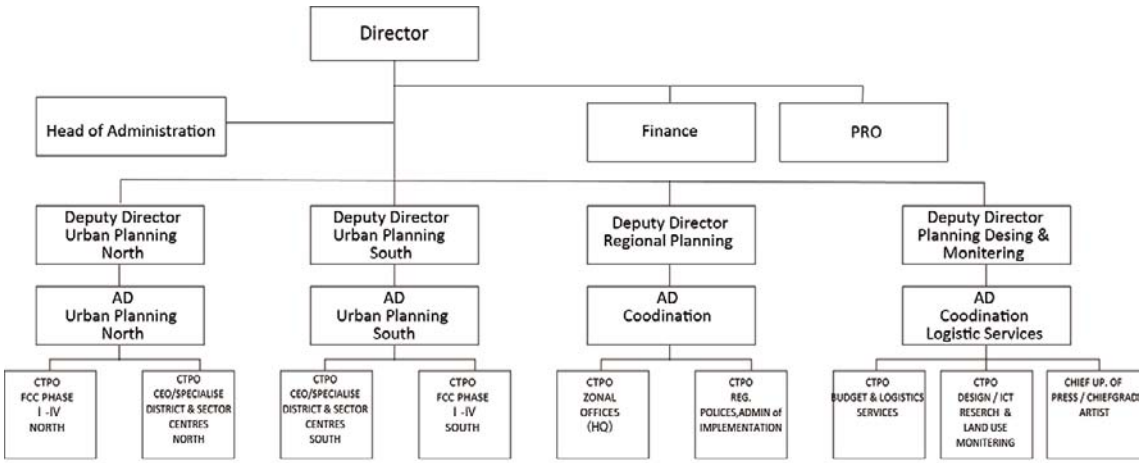
The Department of Urban and Regional Planning (URP) of FCDA has 3 divisions and about 110 staff members. The organization reviews the AMP, prepares detailed plan, changes the land use plan, and prepares engineering design (infrastructure design) consistent with the land use.

The role of each division is as follows:

1) Urban Planning Division
- Formulation of development policies (FCC, FCT)
- Formulation of general land use plan (FCC)
- Implementation of detailed plan and technological design (FCC)
- Formulation of urban development guidance (central areas of FCC, FCT)

2) Regional Planning Division
- Formulation of regional development guidance
- Implementation of regional development plan
- Formulation of plan scheme in area councils
- Coordination with adjacent states

3) Logistics, Budget & Research Division
- Preparation and Implementation of research plan in FCT
- Preparation of budget for implementation, and monitoring



Source：URP

Figure 4.1.1 Organogram of URP

(2) Development Control Department, Abuja Metropolitan Management Council

The Development Control Department is one of the Abuja Metropolitan Management Council (AMMC) departments. The department coordinates development projects and issues development and construction permissions.

The department issues the permission for both development projects (e.g. housing development) and individual constructions, based on a development guideline. The detail of the guideline and the inspection are listed in Section 4.1.3.

(3) Abuja GIS

The Abuja GIS is the department dealing with the FCT geographical information. It consists of a division undertaking land registration and collecting registration fee, and other division digitalizing the information of landowners and integrating land use maps.

A distinct feature of the Abuja GIS database is that it manages the land registration information and land use information in integrated way. The Abuja GIS provides necessary geographical information or drawings to the departments of FCDA and FCTA according to their needs.

(4) Private consulting firms

The review of the AMP, formulation of basic plans for each new development areas and their design works are undertaken by private consultants based on the request from URP and other relating departments. The URP undertakes the supervision, preparation of detailed drawings and coordination in the engineering design.

The consulting firms that took part in the planning works carried out after the 1999 review of the AMP are listed in Table 4.1.1.

Table 4.1.1 Consulting Firms engaged in the Review of AMP and Their Tasks (Extract)

No.	Name of consulting firm	Addresses, contacts	Representative works
1	Albert Speers and Partners	Hedderichstraße 108-110 60596 Frankfurt am Main Postfach 700963 60559 Frankfurt am Main Phone: +49 69 605011-0 Fax: +49 69 605011-500 mail@as-p.de	Review of the Abuja Central Area, Transportation Context Studies, FCC Phase IV North
2	EDRES consultants	Gf 19, Main Block, Murtala Mohammed Square, Ungwan Boro, Kaduna North, Kaduna, Nigeria	FCC Phase IV South, FCC Phase V
3	Multi Systems Consultants	Suite S13, Febson Mall, No.2, Ktiwe Street, Zone 4, Wuse, Abuja, FCT, +234 805 218 2128	Review of Landscape Master plan
4	Femi Oloma & Co	Executive Suite 9th Floor Broking House 1 Alhaji Jimoh Odutola Street PMB 5035, Ibadan, Nigeria 234 2 8721058	Detail site planning
5	KADIRI ASSOCIATES LIMITED	Oscar House, 11, Ewupe Road, off Ilogbo Road, Ota, Ogun State 08033379393, 08053022949	Detail site planning

Source: JICA Study Team

4.1.2 Procedures of Review and Upgrade of Master Plan

The procedures for further reviews and modifications of the FCT regional and urban master plans are specified in the "Nigerian Urban and Regional Planning Act (Decree[32]. No. 88 of 1992)" as described below.

(1) Establishment of certain bodies (article 5, (b))

For the preparation of the review of the FCT regional and urban master plans, Urban and Regional Planning Board of the FCT should be established.

(2) Composition of the board (article 8)

The Board shall comprise the following members.

(a) a chairman
(b) one representative each of the following professions who shall be a registered member of the relevant profession
  (i) Town planning
  (ii) Architecture
  (iii) Civil engineering
  (iv) Land surveying
  (v) Law; and
  (vi) Estate surveying
(c) one representative of
  (i) the State Environmental Protection Agency
  (ii) the National Electric Power Authority
(d) one representative each of the
  (i) Ministry of Works and Housing
  (ii) Ministry of Agriculture
  (iii) Ministry of Finance
(e) five representatives from the local governments in rotation
(f) a secretary appointed by the Board who shall be the chief executive of the board

Records of past cases in which the board was established could not be obtained during this survey period (It is inferred that the board was established at the time of the review in 1999). For this reason, it is necessary to confirm the details of implementation methods such as the composition of the board and appointment of chairperson.

(3) Function of the Board (article 9)

(a) the formulation of State policies for urban and regional planning;
(b) the initiation and preparation of regional, sub-regional and urban/master plans;
(c) the development control on State lands;
(d) conducting research on urban and regional planning;
(e) the provisions of technical assistance to local governments;
(f) the consultation and co-ordination with the Federal Government and local governments in the preparation of physical plans;
(g) the preparation and submission of annual progress report on the operation of the National Physical Plan as it affects the State; and
(h) the review of the annual report submitted to it by the Authority.

[32] Decree was used as the name of law at the time of enactment. This sentence used previous name of the act (see hettp://www.nigeria-law. Org/LFN-1992.hdm)

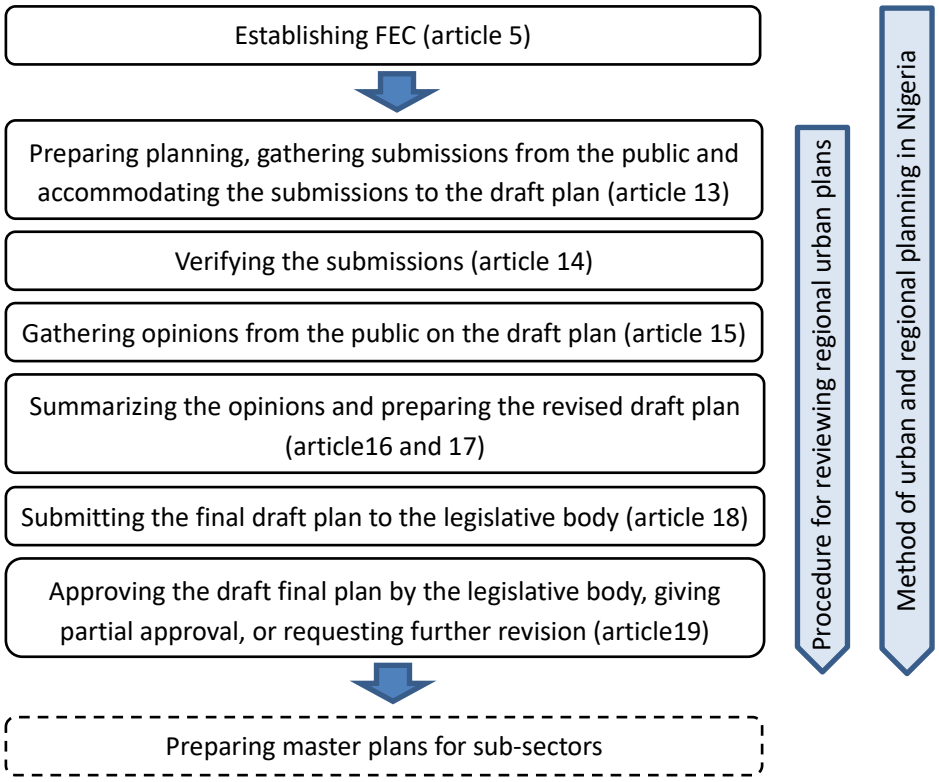
(4) Process of the review of the regional, urban master plans (article 13-19)

(a) The Board[33] calls for submissions during the preparation of the plan from all relevant government organisations, non-governmental organisations and interested members of the public whose contribution shall serve as part of the input towards the preparation of a draft plan during the preparation (article 13).
(b) The Board appoints a technical committee for the purposes of analysing collated submissions (article 14).
(c) The Board submits objections to draft plan by members of the public during the period of exhibition of the draft plan (article 15).
(d) The Board prepares summary of objections and comments and a revised draft Plan which takes account of these objections and comments within a period of two months after the final day (article 16 and 17).
(e) The Board submits final draft plan to legislative body after the consideration of all objections and comments on the revised plan to the appropriate legislative body for approval (article 18).
(f) upon the receipt of the final draft plan, the legislative body may- (article 19)
    1) approve it wholly;
    2) approve part of it; or
    3) refer it to the National Urban and Regional Planning Commission for further consideration and amendment of the whole or part thereof.

A sectorial plan/study under the main document of an urban master plan, normally, would be provided. Detailed transportation study in line with the AMP, for instance, has been reviewed. In terms of process required for revision approval, final presentation conference among all relevant stakeholders within the FCDA shall be held at the draft final stage and report shall be finalized after the meeting with corresponding comments in the meeting. The Federal Executive Council (FEC) gives final approval after FCT minister's concurrence (According to TS, it is not decided whether it will be submitted to FEC at present.

FEC is stipulated by the Constitution of the Federal Republic of Nigeria, 1999. FEC is a committee chaired by the president, and is periodically held to discuss important matters of internal and foreign affairs and make decisions. President, vice president and ministers of federal ministries are the members of FEC to make decisions in all the fields. The composition of FEC members allows ministries to give advice and consultation among them depending on the discussion matters.

[33] In the original sentence in Article 13 to 19, the "Commission" is prescribed as an implementation body, assuming implementation at the national level. Meanwhile, Article 12 prescribes replacement of the implementation body depending on the planning level. Therefore, in this report, the JICA Study Team used the "Board" as the implementation body.



Source：JICA Study Team

Figure 4.1.2 Flow of Reviewing Master Plan

4.1.3 Issuance of Urban Development Permit

The following are the laws and regulations that regulate the development activities in Abuja.

(1) Nigeria Urban and Regional Planning Act

The Law stipulates the following items besides the formulation of master plan and the procedure of modification:

- Administrative organizations regulating development, and procedures
- Land expropriation and compensation
- Adjustment of lands
- Arbitration

The detailed engineering guidance and standards are not provided in the law.

(2) Development Control Manual

Article 91 of the Nigeria Urban and Regional Planning Act defines development as activities including construction of buildings and development of infrastructures above or below ground.

In accordance with the definition, the Development Control Manual was developed. It includes standards for residential development (public facilities, demand of infrastructure, balance of land use, etc.), regulations for building groups (building coverage ratio, floor area ratio, building height, building use in accordance with land use, etc.) and regulations for individual buildings (structure, material, disaster prevention, consideration for handicaps, etc.).

Based on the regulations demonstrated by the manual, the Development Control Department of AMMC (refer to Section 4.1.1 (2)) undertakes the coordination of planning works, gives guidance and issues the development permissions.

(3) National Building Code

The National Building Code regulates the minimal engineering standards for individual buildings in Nigeria. The following are the main items of the code:

- Type of the buildings use and requirements for each type of buildings
- Building materials of buildings and their properties
- Fire prevention requirements
- Performance requirements for building equipment and materials
- Building structure requirements

The JICA Study team confirmed that the national building code was issued in 2006. A revised code has been proposed recently[34]. Although the revised version of the code of 2018 is found on the web, its legal and enforcement status is not clear. Therefore, this report describes the code based on the 2006 version.

4.1.4 Schematic Drawings of Urban Development

The followings are the situation of creating schematic drawings of urban and regional development:

(1) Schematic drawings of master plan

The Nigerian Urban and Regional Planning Act does not provide contents to be covered in the master plan, schematic drawings and its specifications. On the other hand, the act stipulates establishment of development control department for implementation of plans (article 25). The Development Control Department, Abuja Metropolitan Management Council described in Section 4.1.1 (2) corresponds to this department.

(2) Drawings for development control

The Develop Control Manual, which the Development Control Department uses for issuance of permissions, provides the following objects to be examined on development plans of urban areas:

- Land use/density (Section 1.11)
  (10 types of land use6 types of housing development (Section 2.0))
- Securing open spaces (Section 2.7)
- Appropriate placement of road networks and infrastructure facilities (ditto)
- Size and types of housing (ditto)
- Construction and placement of commercial and public facilities (ditto)
- Securing access to public transport facilities (ditto)
- Design for access and mobility for peoples with disabilities (ditto)

Therefore, from the viewpoint of accommodating the contents defined in the master plan to the development control, the plans for land use and infrastructure prepared in line with the master plan should be created with accuracy that enables examination of the objects abovementioned.

The Development Control manual uses the land use map on scale of 1:20,000. The JICA Study Team found printed area maps created by AGIS on scale of 1:7,500. AGIS creates and uses the detailed maps on scale of 1:1,000 with GIS (see Section 4.3)

(3) Plans made by private consultants

Consultants appropriately sets contents and drawing scales in district development planning. For example, the following drawing scale are set for the plans in Abuja North Phase IV:

- Structural plan 1:20,000
- Master plan Abuja north west: 1:10,000
- District plan 1:5,000
- Prototypical subdivision plan 1:1,000

[34] Nigeria announces new national building code, African review, 18.06.2018

Table 4.1.2 Scale and Main Contents of District Plan (Example of Private Consultant)

Type of Plan	Structural Plan	Master Plan Abuja North West	District Plan	Prototypical Subdivision Plan
scale	1:20,000	1:10,000	1:5,000	1:1,000
location	Phase 4_1 + 4_2	Phase 4_2	one district	neighbourhood
main content	• major road network incl. arterial and district collector roads	• residential areas commercial areas	• physical setting, landform and drainage	• layout and urban form
		• industrial / light manufacturing	• urban land use organisation	• residential subdivision layout/ pattern
	• transitway alignment	• district and neighbourhood centres	• assumption on housing needs and standards	• road network and basic utility services
	• trunk infrastructure services as undimensioned utility schemes only	• major public facilities	• service centre hierarchy / layout	• access and circulation
		• green and open space	• public and com-munity facilities	• plot size modules
	• sector and district centre location	• green belt		• public and com-munity facilities
		• circulation network (major roads only)	• circulation network	• landscaped green and open spaces
	• outline land use structure		• landscaping, major green and open spaces, protected areas	
		• major infra-structure facilities		• implementation and phasing
			• utility infrastructure	

Source: Review of the Abuja Master Plan – Master Plan for Abuja North Phase IV West, AS&P

4.2 Development Vision

The vision to make Abuja ”one of the world’s best 20 capital cities by 2020” was formulated under the former FCT Minister, Bala Mohammed (2010-2015) [35,36]. The vision targets to build and administer “a first-class FCT with effective service delivery comparable to those of the best in the World” in strict compliance with the master plan.

The vision contains 6 strategic priorities for realization of four diversifying FCT’s roadmap strategies.

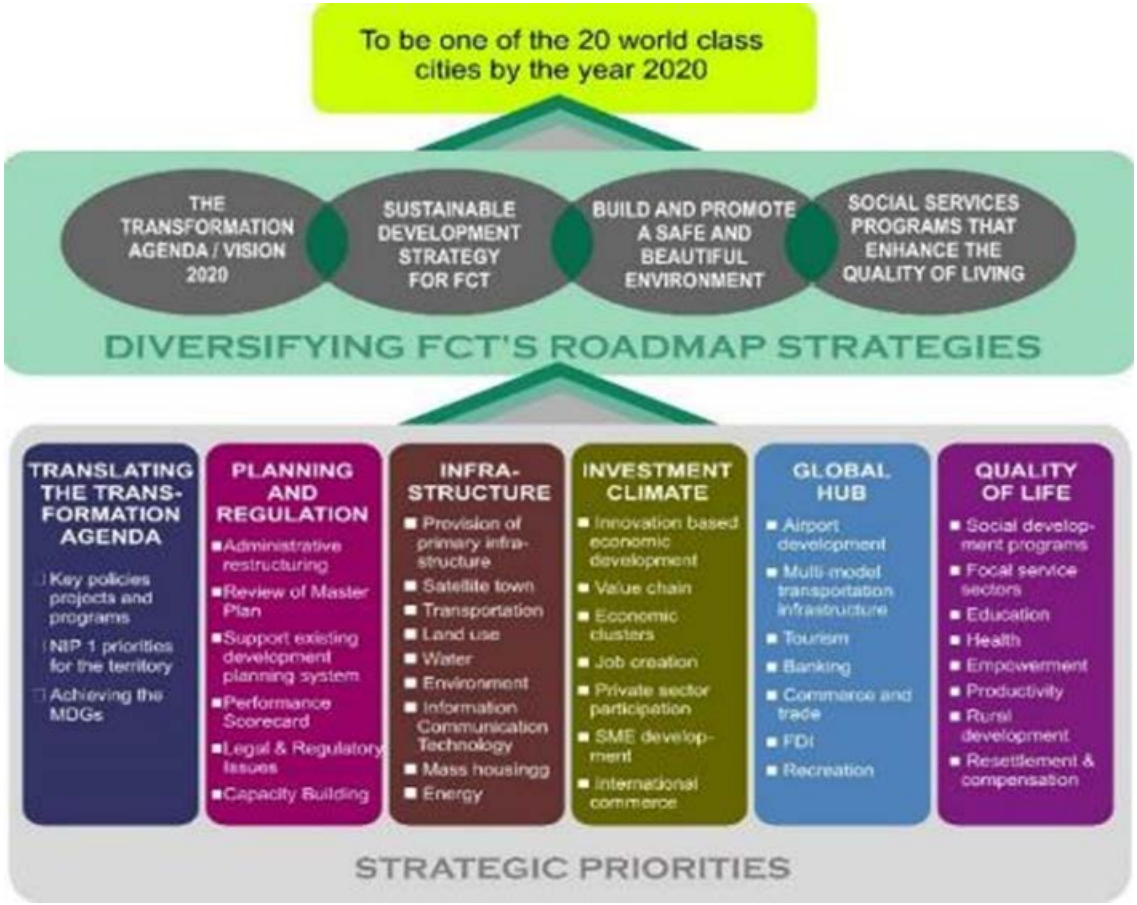
The development goal of the initial 1979 AMP was establishment of an administrative centre serving as a capital city. There are still objections to making commercial development a part of the development goals because of concerns that this may turn the FCT to a high-dense city with chronic traffic jam, like Lagos.

On the other hand, the Development Vision 2020 and development concepts in the new plans formulated after the 1999 reviews propose the diversification of urban functions and activities in the capital city. The study could not find written official documents about these policies, but these development visions and planning documents are considered to represent changes of development visions, needs and directions.

[35]Ministerial Platform to Commemorate National Democracy day 2012, FCT Minister, 2012

[36] The New Vision, Abuja: The building of A Smart City, TELL, Anayochukwu Agbo, 2014

The JICA Study Team could not confirm the handling and update situation of this development vision under the current FCT Minister. However, the result of interview with URP indicated that the development vision is old and must be updated.



Source: Ministerial Platform to Commemorate National Democracy day 2012

Figure 4.2.1 FCT 's Roadmap Strategies

4.3 Current Status of Mapping and Geographical Data Collection System

The Office of the Surveyor General of the Federation (OSGOF) is in charge of organizing and managing map data necessary for master planning and feasibility studies in Nigeria, such as the tasks concerned with digital coordinate setting and digital map production. However, GIS data and mapping production and management are under the responsibility of Abuja GIS, FCTA.

The current status of the GIS data preparation progress of "FCC and surrounding areas," "Partial area along FCT boundary," and "Areas other than FCC and surrounding areas and partial area along FCT boundary" varies. Using the current data, the "FCC and surrounding areas" are expected to prepare 1/1,000 scale maps. On the other hands, "Partial area along FCT boundary" and "Areas other than FCC and surrounding areas and partial area along FCT boundary" areas could prepare 1/15,000 to 1/25.000 scale maps (refer to Table 4.3.2).

Table 4.3.1 Existing Geographical Data of FCT

		FCC and a part of surrounding area (Blue area in Figure 4.3.1)	Partial area along FCT boundary (Pink area in Figure 4.3.1)	Areas other than FCC and surrounding areas and partial area along FCT boundary (White area in Figure 4.3.1)
GIS data				
	Administrative boundary (block)	Scale level 1/1000 (2018/AGIS) *	Scale level 1/25,000 (2015/ OSGOF)	Scale level 1/500,000 (2018/AGIS)
	Road	Scale level 1/1000 (2018/AGIS)	Scale level 1/25,000 (2015/ OSGOF)	No data
	Feature (building)	No data	No data	No data
Ortho-photo data		Resolution 10cm (2018 /AGIS)	Resolution 2.5m (2013/OSGOF)	Resolution 2.5m (2013/OSGOF)
DEM		20m (2012/ OSGOF)	20m (2012/ OSGOF)	20m (2012/ OSGOF)

Source: prepared by the JICA Study Team based on the interview to Abuja GIS

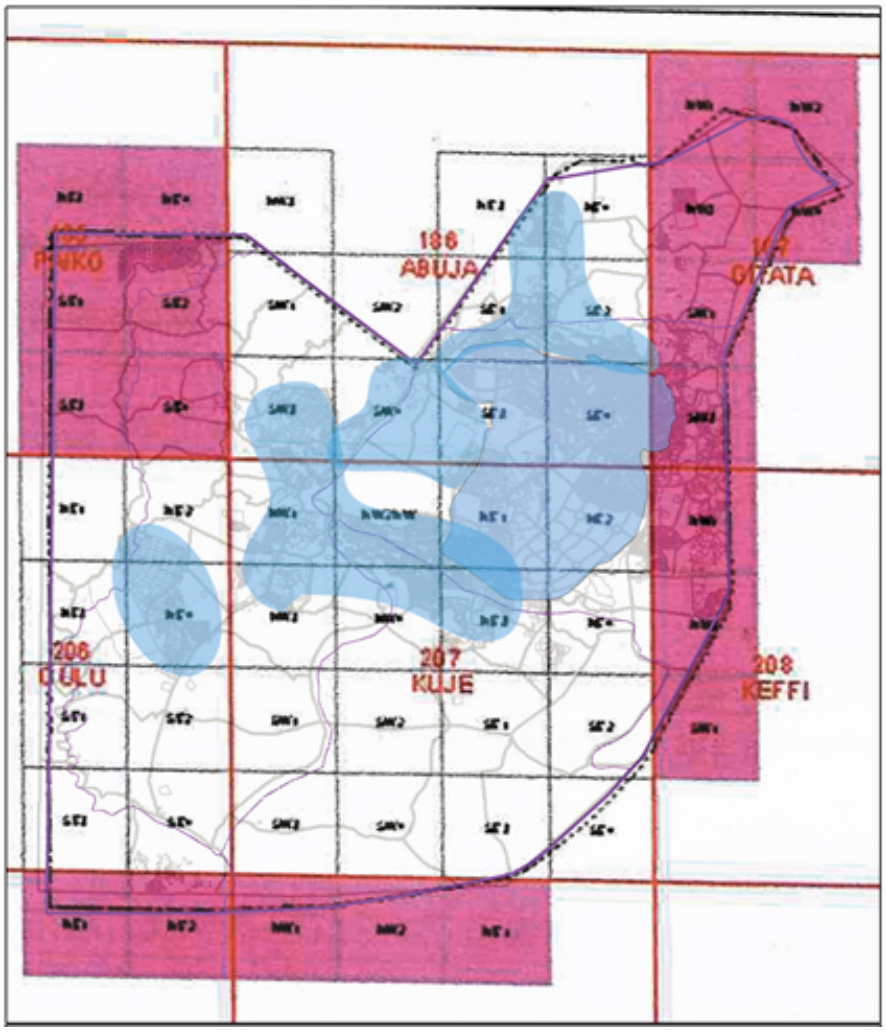
Note: GIS Data is organized in land use, land use concentration, land owners, and land development progress by each city block.

Table 4.3.2 Expected GIA Data to be (can be) Prepared for FCT

		FCC and a part of surrounding area (Blue area in Figure 4.3.1)	Partial area along FCT boundary (Pink area in Figure 4.3.1)	Areas other than FCC and surrounding areas and partial area along FCT boundary (White area in Figure 4.3.1)
GIS data				
	Administrative boundary (block)	Scale level 1/1000 (2018/AGIS) *	Scale level 1/25,000 (2015/ OSGOF)	Under preparation of administrative boundary map at 1/25,000 scale by OSGF
	Road	Scale level 1/1000 (2018/AGIS)	Scale level 1/25,000 (2015 / OSGOF)	Under preparation of administrative boundary map at 1/25,000 scale by OSGF
	Feature (building)	Building layout map at 1/1,000 scale can be prepared with ortho-photo data at 10cm mesh.	Building layout map at 1/15,000 to 1/25,000 scale can be prepared with ortho-photo data at 2.5m mesh.	Building layout map at 1/15,000 to 1/25,000 scale can be prepared with ortho-photo data at 2.5m mesh.

Source: prepared by the JICA Study Team based on the interview to Abuja GIS

Note: GIS Data is organized in land use, land use concentration, land owners, and land development progress by each city block.



Source: Prepared by the JICA Study Team

Figure 4.3.1 Situation of GIS Data Management

4.4 Plan and Methods of Resettlement in the FCC

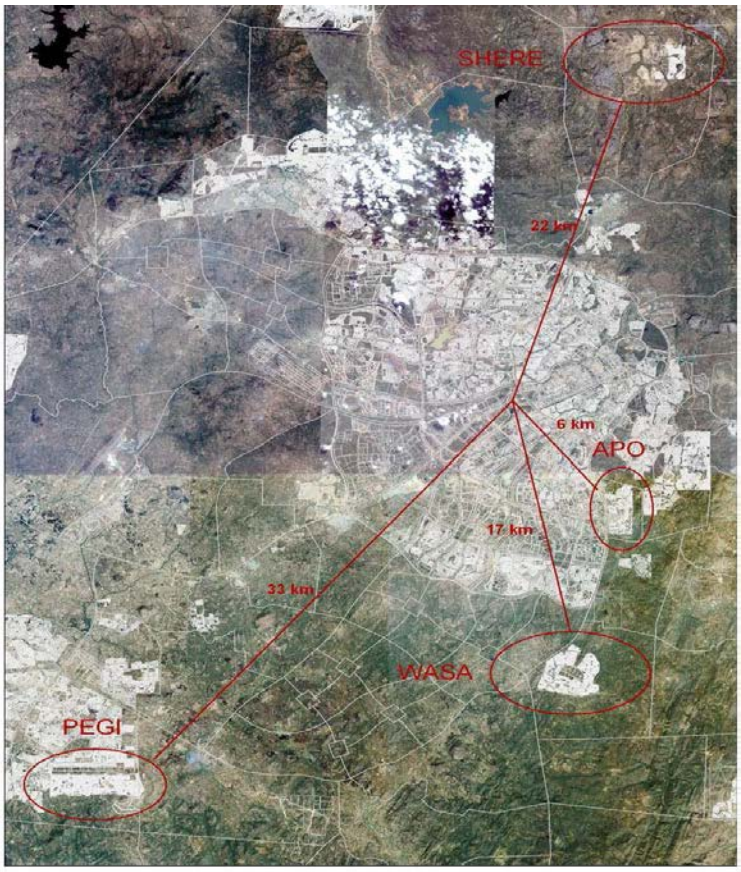
The Department of Resettlement and Compensation is in charge of the implementation of the resettlement and compensation scheme within the FCT. Chapter 5 of the Land Use Act provides the resettlement and compensation process in Nigeria. Regarding the indigenous people within the FCT, the 1976 FCT Act proposed moving all the existing population out of the territory in order to apply the principle of "equal citizenship" to all people within the FCT. However, since the proposal requires a large amount of funds for compensation, this policy was changed in 1978, allowing people to stay within the FCT. In 1992, the relocation in Garki village became unnecessary as a part of FCC Phase I project, but the policy was withdrawn in 1999 due to the opposition by Garki residents and lack of government will. In 2003, FCDA decided to return to the original policy based on the FCT Act, and started the resettlement of indigenous residents and relocation of squatter settlements. The policy on the handling of indigenous people within the FCT has been changing as described above.

The Department of Resettlement and Compensation implements the resettlement of indigenous people and relocation of squatter settlements. As for the resettlement of indigenous people, Apo, Galuwui/Shere, and Wasa scheme are being implemented. Areas covered by each program site are as follows:

- Apo: Garki, Akpanjenya and Apo, 2,455 houses
- Galuwui/Shere: 12 communities such as Jabi Samuel, Jabi Yakubu, and Utako, 6,147 houses
- Wasa: Karomanjigi, Kuchingoro, Chika, Aleita, and Piwoyi, 2,589 houses

(Source: The Centre on Housing Rights and Evictions Social and Economic Rights Action Center, ”The Myth of Abuja Master Plan”, May 2008)

In addition, relocation programmes for squatter settlements are implemented in Kuchiko, Gidan Mangoro, Pegi and Yangoji.



Source: Ibrahim Usman Jibril, “Squatter Resettlement/ Relocation Programme in Abuja, Nigeria and the Issue of Land Title Security”, FIG Working Week 2009

Figure 4.4.1 Sites for Resettlement Schemes

There are also inadequacies in the Land Use Act on resettlement and compensation of residents. Therefore, the World Bank compares regulatory provisions with the World Bank’s resettlement policy in implementation of projects and examines measures to fill the gaps. The table below shows an excerpt of the resettlement policy in the Resettlement Policy Framework of "Nigeria Electricity Transmission Project (NETAP)".

Table 4.4.1 Comparison between the Nigerian Law and the World Bank's Policy.

Category	Nigerian Law	World Bank Policy (OP4.12)	Measures to Filling the Gaps
Information and Consultation	It's lawful to revoke or acquire land by the governor after issuance of notice. No consultation is required.	Project Affected Persons (PAPs) are required to be meaningfully consulted and participate in the resettlement process.	PAPs shall be meaningfully consulted and engaged in the resettlement process.
Timing of Compensation	The law is silent on timing of payment.	Compensation implementation to take place before construction or displacement.	Compensation and resettlement implementation to take place before construction or displacement.
Livelihood restoration	Makes no prescribed mitigation for livelihood restoration measures.	Requires that displaced people/ PAPs should be assisted in improving their livelihoods and standards of living or at least to restore them to pre-project levels.	Livelihood restoration measures will be put in place for PAPs.
Grievance Process	The land use and allocation committee appointed by the Governor is responsible for managing all disputes/grievances and compensation matters.	Requires that a grievance redress mechanism be set up early constituting the representative of PAPs and, prefers local redress mechanism. The law court is the last resort when available mechanisms or outcomes are unsatisfactory to PAP.	A grievance redress committee (GRC) shall be established early and existing local redress process shall be considered to address issues of project induced grievances. PAPs or their representatives shall be members of the GRC.
Squatters	Not entitled to compensation for land, but entitled to compensation for crops.	Are to be provided resettlement assistance in addition to compensation for affected assets; and other livelihood restoration measures as needed.	Are to be provided resettlement assistance in addition to compensation for affected assets and other livelihood restoration measures as needed.
Owners of "Nonpermanent" Buildings	Cash compensation based on market value of the building (that means depreciation is allowed).	Entitled to in-kind compensation or cash compensation at full replacement cost including labour and relocation expenses, prior to displacement and may salvage materials without such being deducted from compensation amounts.	Entitled to in-kind compensation or cash compensation at full replacement cost including labour and relocation expenses, prior to displacement.
Owners of "Permanent" buildings, installations	Resettlement in any other place by way of reasonable alternative accommodation or Cash Compensation based on market value.	Entitled to in-kind compensation or cash compensation at full replacement cost including labour and relocation expenses, prior to displacement and may salvage materials without such being deducted from compensation amounts.	Entitled to in-kind compensation or cash compensation at full replacement cost including labour and relocation expenses, prior to displacement.

Source: Transmission Company of Nigeria, 'Resettlement Policy Framework, "Nigeria Electricity Transmission Project (NETAP)), April 2017

4.5 Urban Planning Issues of FCC and the Satellite Towns

Comparing the current situation of AMP and related plans with the current urban and regional development aspect, the following matters are observed as the causes of the urban issues.

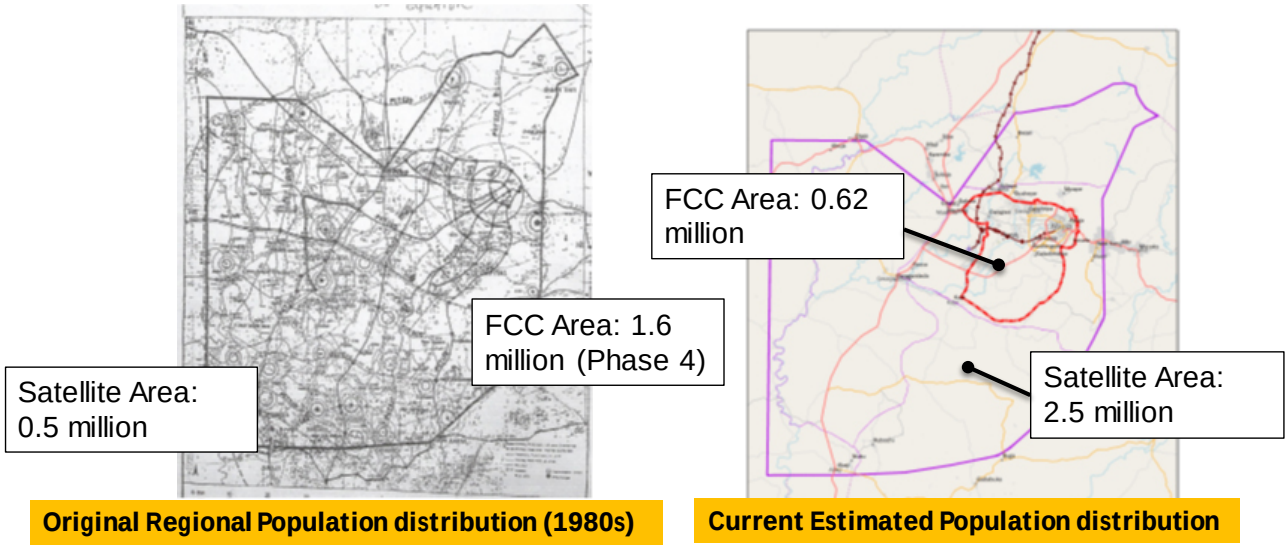
(1) Unpredicted population distribution, and inconsistency between planning and urban situation

The initial AMP (1979) was planned assuming 1,600,000 population in the FCC, which has been amended to 3,000,000 after the review of AMP.

There has not been reliable demographic statistics of Abuja area since the last census survey in 2006. The National Bureau of Statistics[37] provided estimated population of the FCT as 3,564,126 persons in 2016. The information does not include population in smaller administrative units such as FCC and local councils.

The JICA Study Team estimated the population distribution in 2019 based on the UN population division[38] estimation and urbanized areas from satellite images. As the result shown in the Figure 4.5.1 confirms, fewer peoples reside in FCC than it was planned, and the population of the FCT is increasing.

For further planning and review of the AMP, the population distribution in the area should be adequately grasped and the result should be reflected in the relating plans.



Source: (Left) Prepared by the JICA Study Team based on the document of SDTT / (Right) Prepared by the JICA Study Team

Figure 4.5.1 Population Distribution in Original Regional Plan and Current Estimation

(2) Reactions to change of spatial structure in regional development level

The regional development plan has been formulated more than 35 years ago, and it does not reflect the actual situation[39]. The plan is also considered out of date due to unexpected migration into the area. In addition, initial planning and detail planning works of some areas are conducted individually, and they have not been fully integrated with and reflected in the entire FCT master plan.

The current urban environment of the FCT is more overcrowded than it was assumed, compared with the situation of delayed urbanization in the FCC. Therefore, urban issues are likely to arise in the FCT. In order to resolve these urban issues including the provision of transportation for commuting in urbanized areas, it is desired to upgrade the regional plan of the FCT with integration with the FCC.

[37] Population 2006-2016, National Bureau of Statistics, 2019

[38] Population Database、United Nations Department of Economic and Social Affaires, Population Division

[39] Zaliha'u Ahmedn, Building a New Capital City

(3) Responses to urban sprawl

Migration into the FCT has resulted in construction activities including urban sprawl and expansion into the unplanned areas of the FCC and satellite towns, mostly located around former agricultural villages and planned areas. The satellite towns were planned as areas for agricultural activities to support the daily lives of the central area of the capital city in the initial AMP. However the actual situation of satellite towns are quite different from what it was planned for.

Some of residents living in these unplanned areas have contract with land owners, but others are illegal occupants[40]. For the improvement of urban living environment, further study and review of the master plan, and updating and redefinition of relocation schemes are necessary with consideration of the affected persons.

[40] Result of interview to URP

Chapter 5 Direction of Urban Planning and Private Sector (including PPP)

5.1 Urban Planning Project

5.1.1 Target of Urban Planning Project

5.1.1.1 Urban Facility Planning

AMP specifies the following urban facilities and infrastructures to be developed within the FCC:

1) Road, Highway, Parking space
2) Park, Garden
3) Water supply facilities, Electric supply facilities, Telecommunication networks, Sewage drainage facilities, Solid waste facilities
4) Educational facilities : Kindergarten, Primary school, Junior high school, Teacher educational school, Vocational training school, University etc.
5) Cultural Facilities : Library, Museum, Sports facilities
6) Medical facilities : Hospital (including clinic)
7) Social Welfare Facilities : Fire station, Police station, Post office, Conference centre, Public hall
8) Recreation facilities

(Source: AMP)

5.1.1.2 Housing

AMP estimates the housing development needed based on the future population forecast of the FCC and the recommended house type; however, there is no specific method for the housing supply. Table 5.1.1 illustrates the distribution of the households by house type in the FCT. The households who have formal access to private houses (single household or two household type) and apartments[41] (housing types highlighted in Table 5.1.1) accounts for 76% of the total, and the remaining 24% do not have access to any formal type of housing. There are several areas where many house owners do not have acceptable living environment due to lack of basic infrastructures. Housing is a series issue not only in the FCT but also throughout the country in general; therefore, the federal government has developed the National Housing Policy in 1991 and further amended it in 2006. In order to implement the amended policy more effectively, the government has set Mass Housing Scheme in 2000 and Land Swap Initiative in 2013. In addition, the policy of private house mortgages program[42] under the Federal Mortgages Bank of Nigeria (FMBN) has been in effect since 2014.

Table 5.1.1 Household Distribution by House Type in the FCT (2019)

Type of housing	Household	Population	Rate
House on a Separate Stand or Yard	290,086	1,424,321	46%
Semi-detached House	47,088	231,202	7%
Traditional/ Hut Structure	11,561	56,766	2%
Flat in Block of Flats	142,045	697,439	23%
Rooms/Let in House	132,917	652,622	21%
Informal/ Improvised Dwelling	3,044	14,946	0.5%
Others	3,629	17,821	1%
Total	630,370	3,095,118	100%

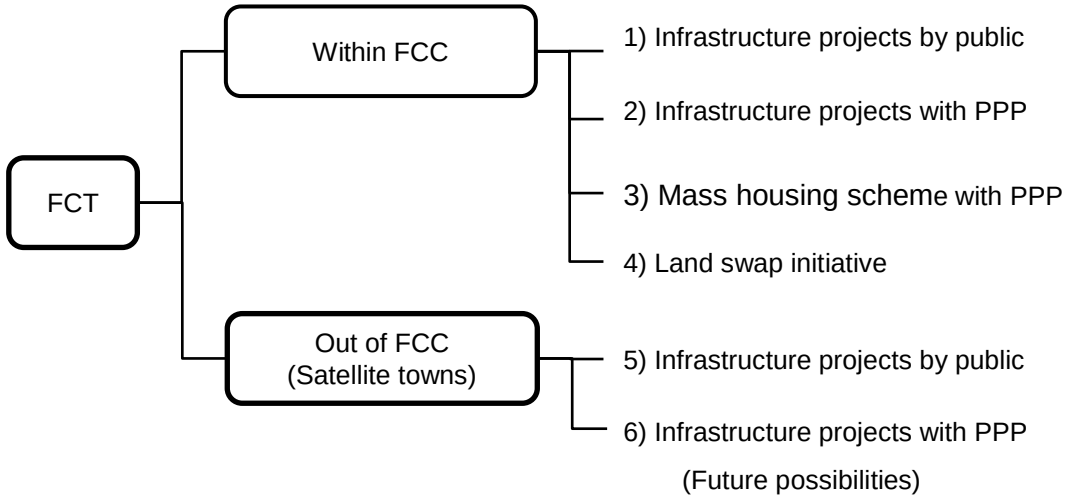
Source: prepared by the JICA Study Team based on National Bureau of Statistics, Nigeria (2006)
Note : The number of household access (number of household and population) of FCT was calculated based on the population in 2019 which was calculated by the JICA Study Team shown in Table 2.1.1 and the ratio of household by house type described in National Bureau of Statistics, Nigeria (2006)

[41] Private houses (individual or two household types) and apartment houses are considered as houses that are surrounded by roofs and walls to maintain privacy under this survey.
[42] This is the housing loan program which had targeted 10,000 individuals in 2014. It specifically targets low-income people to purchase affordable houses, and loan period was set for 20 years with the amount from 200 Naira to 2,000 Naira under the program design.

5.1.2 Schemes for Urban Planning Project

Figure 5.1.1 illustrates the project scheme patterns for urban facility and housing development in the FCC as described in Section 5.1.1. There are mixed development schemes in the FCC consisting of development driven by public organizations, and development with the participation of the private sector. An infrastructure project with PPP introduced in Katampe District is for basic infrastructure development including road, power supply, water supply, sewer system and waste management facility. The Mass Housing Scheme is another type of urban project through PPP for developing a large number of housing units. Land Swap Initiative is a private investment initiative for a large number of housing unit development. There are housing development schemes focusing on large district areas. These schemes utilize the profit from the development in the FCC and cooperate with private sectors for infrastructure development. However, the schemes (2) and (3) shown in Figure 5.1.1 have delayed the project implementation due to multiple causes[43], and the Land Swap Initiative is expected to be an effective scheme for the urban development implementation. There are a total of 4,158 houses supplied under the Mass Housing Scheme as Table 5.1.3 shows. The number of houses constructed under the scheme accounts for 1.4% of the total number of planned houses in the FCT.

Based on the interview with the private developers, the private sector is more interested in the CBD area of the FCC, which could be highly developed (around target areas of FCC Phase I). Although no urban redevelopment has been implemented by the private sector so far, there is a potential to promote it. On the other hand, the satellite towns have a problem with access to the FCC and as a result, that private sector does not show much interest in investing in these towns but in the FCC itself. Therefore, the development in the Satellite Town outside of FCC are mainly driven by conventional public works.



Source: JICA Study Team

Figure 5.1.1 Infrastructure and Urban Development Schemes in the FCT

Table 5.1.2 Summary of Urban Development Schemes

Name of Scheme	Summary
Mass Housing Scheme	• It is a scheme focused on mainly integrated affordable housing and life infrastructure development. • Private developers should obtain the "Right of Occupancy (RO)" of the land from the government, the land owner, in order to avoid payment for land acquisition. The private developer should be able to use the land for 99 years after obtaining RO. After RO is obtained without pay, the developers start development of, for instance houses. Then the developed land with a house will be sold to an end user including the prices of land and house. The collected land allowance (land fee) will be transferred to the government agency(s), the actual land owner. • The target areas are inside of FCC Phase II and III areas. All these lands are public land.

[43] The causes of Mass Housing Scheme and infrastructure development implementation delay are detailed in Section 5.2.

Name of Scheme	Summary
	• There were lands where the right of occupancy has been issued (so called "brown field"). Therefore, development activities in some plots allocated were put on hold because converting the right holder did not go smoothly. • Private developers are required to develop the primary infrastructure instead of bearing land acquisition costs (see detailed in Section 5.2.1 (3), Mass Housing Scheme).
Land Swap Initiative	• Basic scheme is as same as Mass Housing Scheme. • Target area is a part of FCC Phase IV, and all these lands are public land. The allocated area is the land where there is no existing holder of the right of occupancy (right of occupancy) (so called "Greenfield") other than the private developers participating in the initiative. • The differences to Mass Housing Scheme are indication of list of necessary primary infrastructure, development area that the private developers can sell (secure minimum 40% of development area for FCTA), implementation schedule in the project contract. Based on the above control, minimum required development quantity of houses and primary infrastructure should be assured (see detailed in Section 5.2.1 (4), Land Swap Initiative)

Source: Interview to AIIC

Table 5.1.3 Number of Houses supplied (or planned to supply) under Mass Housing Scheme (at 2012)

Development stage	Number of housing	Rate
Project completion	4,158	12%
In the middle of construction stage (Almost finished)	2,704	8%
In the middle of construction stage (roof construction stage)	8,884	25%
Design stage	19,913	56%
Total	35,659	100%

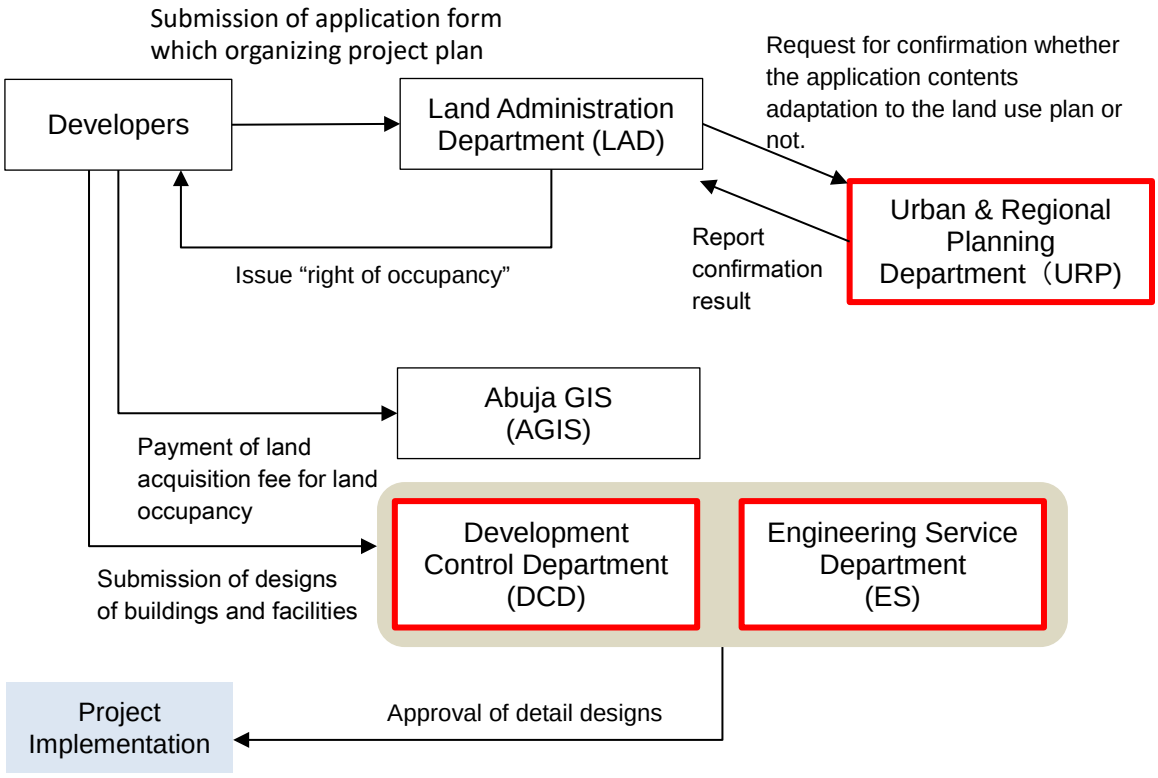
Source: American International Journal of Contemporary Research

5.1.3 Limitation of Urban Planning Project (Development Permit)

All development projects shall apply for a development permit regardless of the project development area.

A developer shall prepare an application, which summarizes the project development plan, and submit it to the Land Administration Department (LAD) under FCDA. The submitted application shall be immediately transferred from LAD to URP. URP should check whether the project plan is in line with the master plan (AMP) land development plan. The evaluation particularly focuses on the following three points: (1) correspondence with the AMP road network plan, (2) correspondence with the land use concentration plan of AMP (checking the required housing development is proposed), and (3) proper planning of necessary public facilities. The applications without any problems will be approved and the project developer will be provided with the Right of Occupancy through LAD.

The developer should, as the second step, submit the project plan with RO to the Development Control Department (DCD) under FCTA and the Engineering Service Department (ESD) under FCDA. Both departments review the details of the building and facility plans shown in the project plan. After obtaining the approval from both departments, the developer should be able to implement the project. Figure 5.1.2 illustrates the permit application procedure.



Source: JICA Study Team prepared based on the interview to AICL

Figure 5.1.2 Procedure of Development Application and Permit

5.2 Trends in Private Sector Investment (including PPP) and Related Policies

5.2.1 Policies related to Promotion of Private Participation in Infrastructure Development

The participation of the private sector in the infrastructure development is a method that is being promoted globally. This method is also being introduced into infrastructure and housing development in the FCT. The following are the main policies related to promotion of private sector participation in the whole country and the FCT:

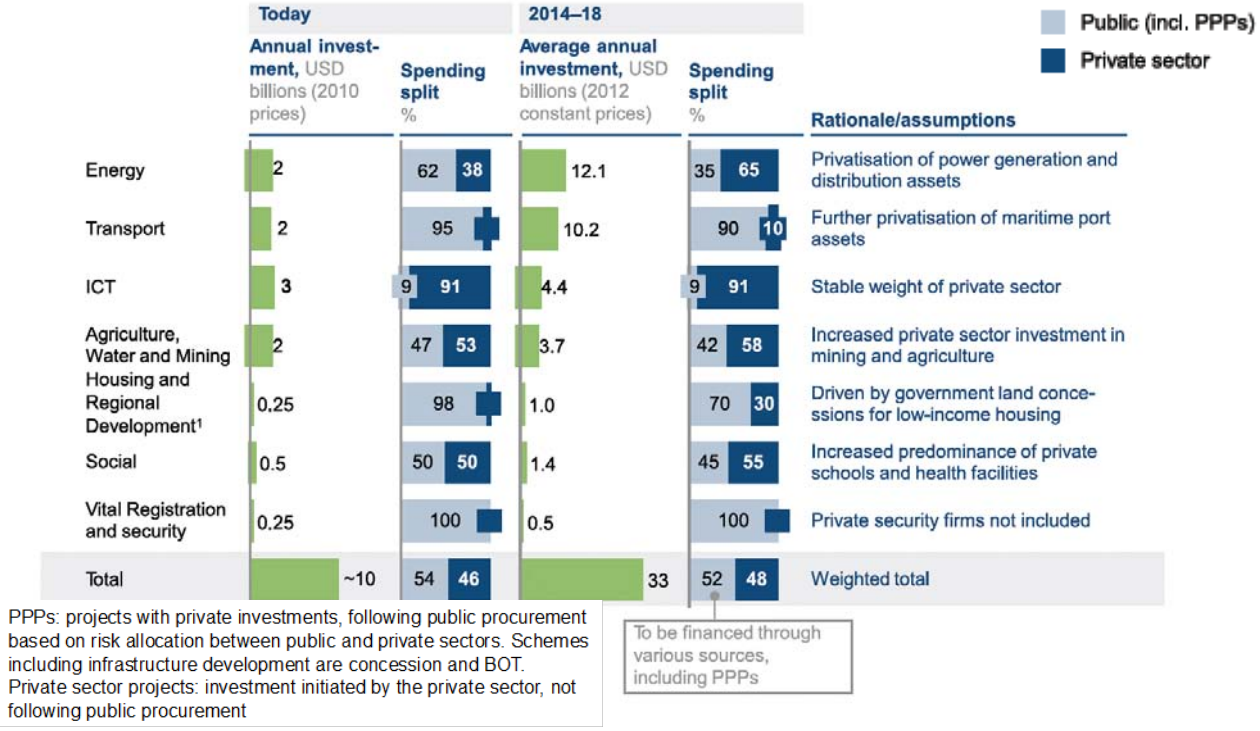
- National Integrated Infrastructure Master Plan (National Planning Commission, February 2015)
- National Policy on Public Private Partnership (Infrastructure Concession Regulatory Commission, 2009)
- Mass Housing Scheme with PPP (FCTA, 2000)
- Land Swap Initiative (FCTA, 2013)

Outline of each policy is described below.

(1) National Integrated Infrastructure Master Plan (NIIMP)

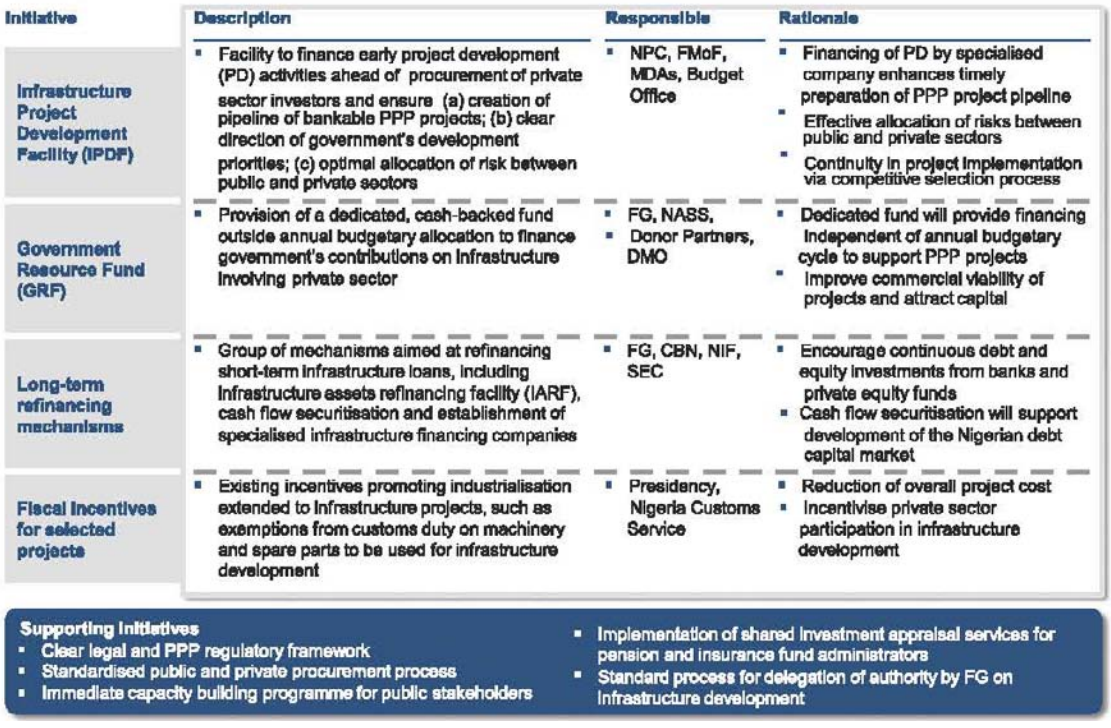
The “National Integrated Infrastructure Master Plan” (NIIMP) was formulated by the National Planning Commission in February 2015 as a blueprint for promoting infrastructure development in Nigeria. This plan shows the infrastructure investment in each sector which is necessary for future growth, priority projects, and financing and implementation plan. This plan assumes utilization of private sector because it is difficult to respond to the required infrastructure investment only with the conventional public financing. Figure 5.2.1 shows the investment shares of the public sector and private sector in NIIMP’s investment plan. Approximately half of the total demand is expected to be invested by the private sector. In this figure, PPP projects are included in the public sector investment. The sectors where private-led investment is particularly required are ICT and

energy. Even in agriculture, water, mining and social facilities (schools, hospitals, etc.), about 60% of total demand is expected to be borne by the private sector. Regarding the PPP projects, NIIMP estimates that Nigeria would have a market size of 15 to 25 billion US dollars in 5 years from 2014. The initiatives shown in Figure 5.2.2 are proposed as measures necessary for increasing the share of the PPP projects.



Source: National Planning Commission, "National Integrated Infrastructure Master Plan", March 2015

Figure 5.2.1 Public-Private Sector Split on Infrastructure Spending in NIIMP



Source: National Planning Commission, "National Integrated Infrastructure Master Plan", March 2015

Figure 5.2.2 Suggested Initiatives for Increasing Share of PPPs

NIIP summarizes what is required for promoting private sector participation by sector. Table 5.2.1 shows the excerpts of main items of relevant sectors. As the table shows, the major issues in promoting implementation of PPP projects are the federal government's commitment, government support and procurement process. As mentioned in several sectors, there are also problems with right of way (ROW), financing scheme and tax system.

Table 5.2.1 Requirements for Promotion of Private Sector Participation in Infrastructure Development

Sector	Requirements for Promotion of Private Sector Participation
Transport	• Federal government commitment to adopting a PPP framework for road construction, maintenance and management • Access to concessionary (cheap) financing and long-term capital, right of way and tax exemption and duty waivers • Government support in terms of guarantees required to enhance the viability of projects
Energy	• Implementation of the transmission reinforcement plan to address transmission constraints and improve grid capability • Guarantee of right of way for infrastructure development and reduced cost of securing access rights
ICT	• Acceleration of right of way permits • Harmonization of multiple tax, reduction of taxes on computing hardware and locally produced software • Release of the spectrum for LTE/wireless data • Ensuring consistent minimum provision of 18 hours of power supply per day
Water (Water Supply and Sewerage)	• Execution of a PPP framework through the government procurement process • Adoption of technology for the collection of bills
Housing	• Complete review of the Land Use Act • Reform of Federal Housing Authority (FHA), including empowering the private sector to drive policy formulation • Enactment of a housing finance policy that focuses on ensuring access to affordable housing • Revamp of Federal Mortgage Bank capital base and primary mortgage institutions (PMIs)

Source: National Planning Commission, "National Integrated Infrastructure Master Plan". March 2015

(2) National Policy on Public Private Partnership (N4P)

The "National Policy on Public Private Partnership (N4P)" is a national policy on PPP formulated in 2009 and promoted by the Infrastructure Concession Regulatory Commission (ICRC), which is responsible for promoting, supporting and monitoring the implementation of PPP projects at the federal level. The objectives of the partnership policy are stated from three major aspects: economy, society and environment. The main objectives are to accelerate investment in new infrastructure and upgrade existing infrastructure from the economic aspect, to ensure balanced regional development and increase access to quality public services for all members of society from the social aspect, and to protect and enhance the natural environment from the environmental aspect. Laws stipulating implementation of projects with PPP scheme have not been enacted. Contracting agencies are supposed to refer to other related laws as necessary. The following are the laws related to PPP project implementation:

- Land Use Act 1978
- Privatisation and Commercialisation Act 1999
- Infrastructure Concession Regulatory Commission (Establishment) Act 2005
- Fiscal Responsibility Act 2007
- Public Procurement Act 2007

N4P defines that PPP includes a wide range of contractual agreements between public and private sectors. The following are the PPP's features:

- PPP combines the design and construction (or rehabilitation) of public infrastructure with its maintenance and sometimes with delivery the services directly to users;
- The contract requirements are defined as outputs and service standards to be met;
- Payments to the contractor (or revenues from user charges in the case of a concession) are linked to meeting the specified standards of performance.

The following are the main sectors for project implementation with PPP scheme:

- Power generation plants and transmission/distribution networks
- Roads and bridges
- Ports
- Airports
- Railways
- Inland container depots and logistics hubs
- Gas and petroleum infrastructure, such as storage depots and distribution pipeline
- Water supply, treatment and distribution systems
- Solid waste management
- Educational facilities (e.g., schools, universities)
- Urban transport systems
- Housing
- Healthcare facilities

Types of PPP projects in Nigeria are service contract, management contract, lease contract, concession contract and BOT-type contract.

Solicited PPP project procurement in Nigeria will follow four steps: (1) Project Identification Phase, (2) Project Development and Preparation Phase, (3) Procurement Phase, and (4) Implementation Phase. Major actions taken at each stage are shown in Table 5.2.2. The implementation of a project by PPP is to be proposed by a government agency, that is the executing agency (called as Ministry, Department or Agency (MDA)).

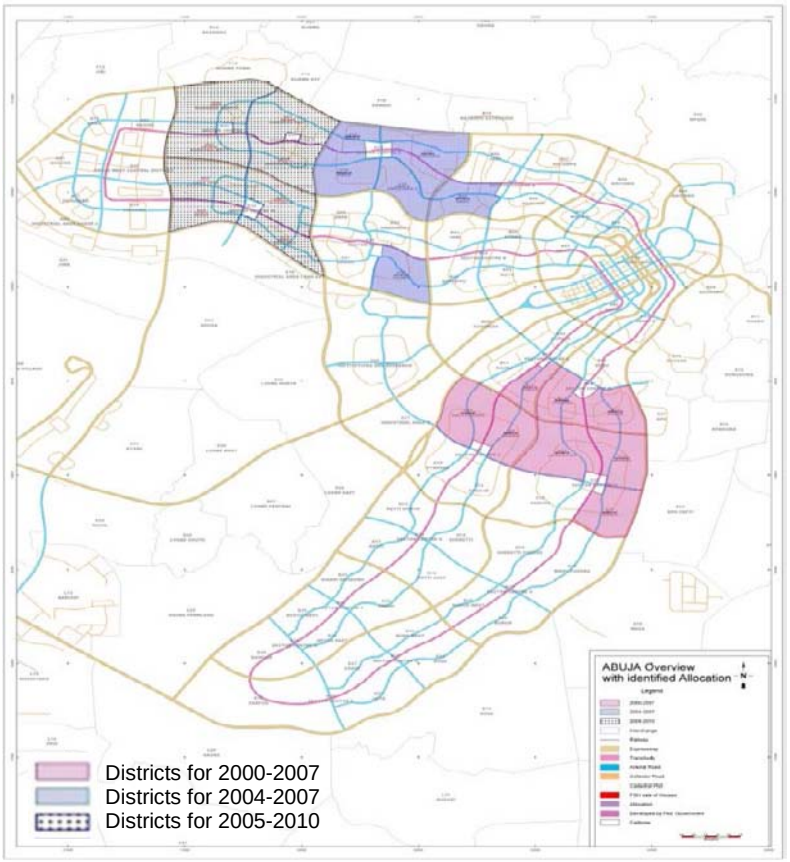
Table 5.2.2 Process of PPP Project Implementation

No.	Step	Major Action
1	Project Identification Phase	• Relevant Ministry, Department or Agency (MDA) prioritizes its projects and identifies those to be developed through PPP. MDA prepares and submits a Project Concept Note to ICRC for assessment. • If ICRC's assessment finds the project eligible for delivery through PPP, ICRC advises MDA to begin Project Development. • ICRC annually develops an eligible pipeline of PPP projects for approval by the Federal Executive Council (FEC).
2	Project Development and Preparation Phase	• The MDA prepares the OBC and submit it to ICRC for review. • ICRC issues an OBC Certificate of Compliance to the MDA. • ICRC consults the Federal Ministry of Finance (FMoF) in order to identify and appropriately handle any risk and contingent liabilities issues that may arise from the project.
3	Procurement Phase	• If the project is approved by FEC, the MDA commences a procurement process leading to the emergence of a preferred PPP Project Proponent. • The MDA negotiates with the preferred PPP project proponent, prepare the Full Business Case (FBC), and submit it to ICRC for review. • ICRC issues an FBC Certificate of Compliance. • The MDA submits FBC along with ICRC's Certificate of Compliance to FEC for approval. If FEC approves the FBC, the PPP contract between the MDA and the preferred PPP project proponent will be signed
4	Implementation Phase	• The preferred PPP Project Proponent achieve financial close. • The MDA supervise the project and conduct regular joint inspections of the project until the end of the contract

Source: ICRC, "ICRC/PPP/Process", June 2017

(3) Mass Housing Scheme with PPP

"Mass Housing Scheme" is a measure that is supposed to supply housing through PPP according to the Abuja Master Plan. This scheme had three phases: 2000-2003, 2004-2007, and 2008-2011 phases. The number of target districts are 14 in the north part of FCC and 8 in the south part, and the total area is 12,691 ha (see Figure 5.2.3).



Source：Ibrahim Usman JIBRIL and Kwankur Tatte GARBA, "The Challenges of Housing Development and Needs in Abuja Nigeria"

Figure 5.2.3 Target Districts for Mass Housing Scheme

This scheme was formulated based on the understanding that private investments did not proceed as expected in the conventional procedure required for housing development. This scheme focuses on creating an environment that makes the entry into the housing market easier for the private sector, and allows private investors to develop housing in FCC without obtaining the right of occupancy necessary for housing development in a usual procedure. Private investors were required to develop basic infrastructure (roads, power distribution lines, and water supply and sewage network) within the allocated districts instead of paying the cost of land acquisition. Total number of private investors participated in this scheme was 350. The government did not allocate the budgets for land acquisition to implement this scheme. The following are the purposes of this scheme, which implemented housing supply through PPP (source: J.E. Ukoje and K.U. Kanu, 'Implementation and the Challenges of the Mass Housing Scheme in Abuja, Nigeria', "American International Journal of Contemporary Research Vol. 4, No. 4; April 2014"):

- To enhance private sector participation in housing delivery through enabling environment
- To bridge the gap between supply and demand of the housing stock within the city of Abuja and its
- Environs

To take off the burden of providing infrastructure and housing for the growing population from government

On the other hand, the goal of the private investors is to deliver decent housing at an affordable cost to the populace and generate sufficient returns in investment (source: J.E. Ukoje and K.U. Kanu, 'Implementation and the Challenges of the Mass Housing Scheme in Abuja, Nigeria', "American International Journal of Contemporary Research Vol. 4, No. 4; April 2014").

In the implementation Phase 1 and Phase 2, this scheme was managed by an ad hoc committee called as PPP unit. However, based on the fact that the development activities by the private investors were not adequately supervised, the Department of Mass Housing was established in FCTA in 2007 to manage this program. Table 5.2.3 shows the predefined area initially set in this scheme and the results of implementation as of 2012. Most of the plots allocated in this scheme were provided to the private investors beyond the initial prescribed area (souse: J.E. Ukoje and K.U. Kanu, 'Implementation and the Challenges of the Mass Housing Scheme in Abuja, Nigeria', "American International Journal of Contemporary Research Vol. 4, No. 4; April 2014", and the interview with the Department of Mass Housing/PPP).

Table 5.2.3 Predefined Area and Implementation Result (as of 2012)

Initial Prescribed Area		Implementation Result		
Type	Plot Area (ha)	Plot Area (ha)	Investor	Total Area (ha)
Land in FCC				
Small Scale Development	1-2	1-2	1	1.65
Medium Scale Development	3-5	3-5	20	90.44
Large Scale Development	6-10	6-10	21	187.73
	Sub-total		42	279.81
	Allocation beyond the initial prescribed area			12,411.88
			Total	12,691.69
Land in Satellite Towns				
Small Scale Development	2-5	Nil	Nil	Nil
Medium Scale Development	6-10	Nil	Nil	Nil
Large Scale Development	11-20	Nil	Nil	Nil

Source: J.E. Ukoje and K.U. Kanu, 'Implementation and the Challenges of the Mass Housing Scheme in Abuja, Nigeria', "American International Journal of Contemporary Research Vol. 4, No. 4"; April 2014"

Many private investors participated in the Mass Housing Scheme and implemented housing development. On the other hand, the following issues are identified through the implementation of this scheme:

- Lack of development of neighbourhood facilities like shopping centre, clinic, police post, school, public library, fire station, post office, and recreational parks

  ⇒Although residents living in the districts need those facilities, only housing development was promoted because private companies did not benefit from the development of neighbourhood facilities.

- Lack of detailed land use and site development plans and detailed engineering designs for most of the districts

  ⇒Since there were many simultaneous developments, development activities by the private investors was not properly supervised and the land use did not match the AMP.

  ⇒In some plots where the land use deviated from the AMP, the Development Control Department demolished residential apartments to restore them to the original land use provided by the AMP.

  ⇒Despite being a scheme implemented from 2000, guidelines for this scheme were formulated in 2009.

- Loss of initial objective of providing affordable housing

  ⇒Participating investors were allocated plots above the financial capacity, so some of them could not get enough money to do the housing development, subdivided the allocated land to small plots and sold them to individuals.

  ⇒The land sales were more profitable for the private investors than accomplishing initial objective of this scheme, namely basic infrastructure development, affordable housing construction and sales.

- Allocation of plots for this schemes was implemented only within the FCC, and no allocation was made in the satellite towns.

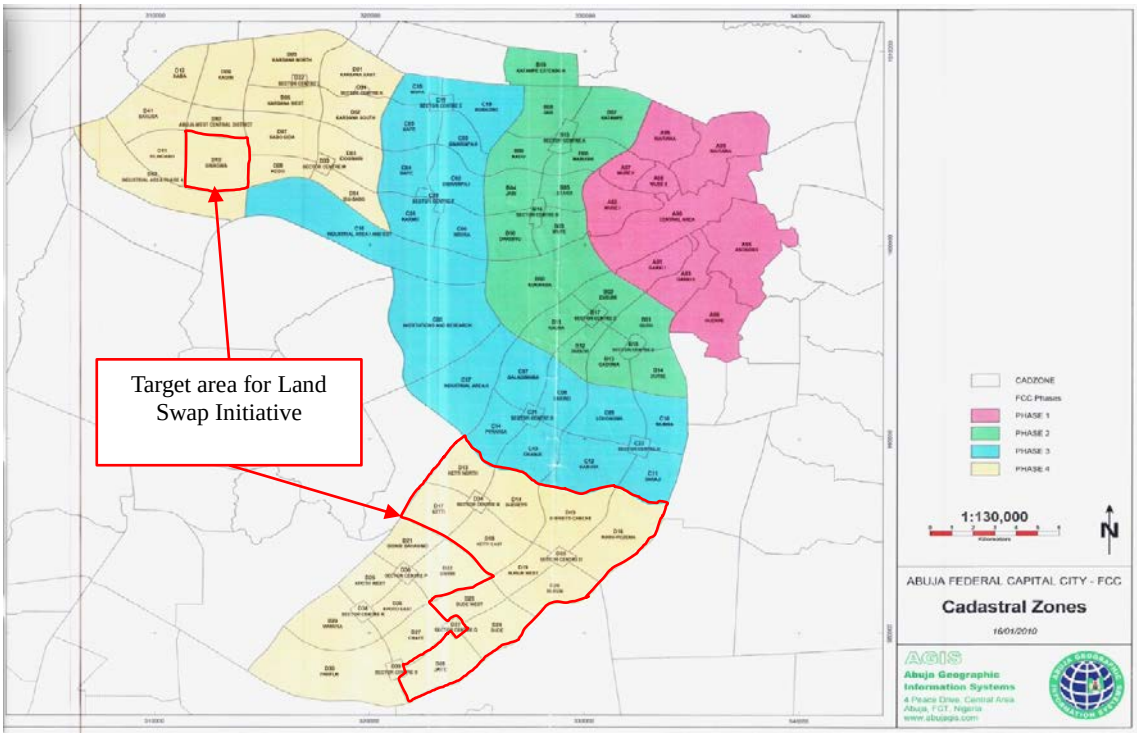
Source: J.E. Ukoje and K.U. Kanu, 'Implementation and the Challenges of the Mass Housing Scheme in Abuja, Nigeria', "American International Journal of Contemporary Research Vol. 4, No. 4; April 2014", Ibrahim Usman Jibril and Kwankur Tatte Garba,"The Challenges of Housing Development and Needs in Abuja Nigeria", and the interviews with Development Control Department and the Department of Mass Housing/PPP

(4) Land Swap Initiative

The Land Swap Initiative is a development system through private investment initiative including basic infrastructure development started in 2013 and is being implemented in FCC Phase IV (South), taking into account the problems emerging from the implementation of the Mass Housing Scheme. The target areas of the Land Swap Initiative are twelve districts consisting of eight districts originally designated (Ketti North, Ketti, Ketti East, Sherretti, Sheretti Cheche in Sector N, and Burun West, Burun, Waru Pozema in Sector O) and four districts added later (Bude West, Jaite, Bude in Sector Q and Gwagwa Phase IV West) (see Figure 5.2.4). This initiative is implemented in line with Article 8 of the Land Use Act.

Twelve districts except Ketti North District and Gwagwa District were divided into two sub-districts: Sub-district A and Sub-district B. A total of 20 sub-districts were allocated to 20 private companies (in Jaite District and Bude West District, one sub-district was allocated for the Land Swap Initiative).

In contracting with the private companies in the Land Swap Initiative, FCTA does not have to bear technical and economic risks. Private enterprises can develop 60% of the allocated sub-district and are required to develop primary infrastructure, and not requested to follow the conventional procedure of land acquisition nor pay for the land. The remaining 40% of the sub-district needs to be retained for FCTA as buildable plots. Abuja Infrastructure Investment Centre (AIIC) is in charge of the implementation of the Land Swap Initiative in FCTA.



Source: prepared by the JICA Study Team based on the map of AGIS

Figure 5.2.4 Target Districts for Land Swap Initiative

The Land Swap Initiative can also be called a PPP project at first glance. However, as mentioned above, FCTA does not have to bear technical and economic risks in the contracts with private companies under the Land Swap Initiative. In addition, in the case of project implementation through PPP, a series of procedures such as creation and approval of documents such as Project Concept Note, Outline Business Case (OBC) and Full Business Case (FBC) are required in line with N4P and the procurement process making the project implementation complicated. From these facts, the Land Swap Initiative was to be implemented as Private Investment Initiative instead of PPP (source: interview with the Department of Mass Housing/PPP).

The following are the terms for the private companies participating in the Land Swap Initiative:

- Commitment fee N350 million
- Preparing detailed design and providing infrastructure in the district within a maximum period of 48 months
- Strict compliance with FCDA Specifications and Standards for district infrastructure works
- Preventing the commencement of real property development or sale of any land in the district until it achieves at least 35% of functional infrastructure works
- Stepwise release of land titles to the private investors
- Submission of an acceptable performance bond from a reputable bank or insurance company
- Retaining of at least 40% of buildable plots in the district by FCTA

(Source: Sen. Bala Abdulkadir Mohammed Honourable Minister, FCT, "Phase IV District Development", Stakeholders Forum April 2012)

The private companies were able to develop and sell the plots from the beginning of the project implementation under the Mass Housing Scheme. This did not lead to planned land use and housing and infrastructure development. Therefore, based on the lesson learned, the private companies should follow the condition under the Land Swap Initiative, that available land with the right of occupancy will be expanded depending on the progress of infrastructure development in the allocated area.

The following are the primary infrastructure that the private companies are required to provide under the Land Swap Initiative:

- The detailed district design and the bill of engineering
- Agreed kilometers of roads of varying specified sizes within the districts
- Agreed kilometers of storm water drains
- Agreed kilometers of foul water drains
- Agreed kilometers of water distribution lines
- Agreed kilometers of street lighting lines
- Agreed kilometers of electrical power distribution lines
- Agreed kilometers of telecommunication ducts

(Source: Sen. Bala Abdulkadir Mohammed Honourable Minister, FCT, "Phase IV District Development", Stakeholders Forum April 2012)

According to a material provided by the Economic Planning, Research and Statistics (EPRS), the progress of the Land Swap Initiative as of October 2017 is as shown in Table 5.2.4. After commencing this initiative, contracts with the first four companies (Urban Shelter Infrastructure Limited, BGD Properties Limited, System Properties Development Consortium Limited, AM-PM Global Network Limited) were entered into in September 2014. Since then, the status of the contracts has not changed.

Table 5.2.4 Progress of Land Swap Initiative

S/N	Phase	Sector	District	Area (ha)	Private Investor	Situation
1	IV South	N	Sheretti (B)	205.03	Urban Shelter Infrastructure Limited	Contracted
2	IV South	N	Ketti (A)	296.01	Haitong Group Limited	Not Yet Contracted
3	IV South	N	Ketti East (A)	182.39	Ketti East Infrastructural Development Company Limited	Not Yet Contracted
4	IV South	N	Ketti East (B)	211.57	Gilmor Engineering Nigeria Limited	Not Yet Contracted
5	IV South	N	Ketti (B)	151.28	Dayspring Property Development Company Limited.	Not Yet Contracted
6	IV South	N	Sheretti (A)	177.98	Dangote Group Plc.	Not Yet Contracted
7	IV South	N	Ketti North	466.58	Excite Business Facilities Ltd.	Not Yet Contracted
8	IV South	O	Sheretti Cheche (A)	314.96	BGD Properties Limited	Contracted
9	IV South	O	Burun (A)	319.4	System Properties Development Consortium Limited	Contracted
10	IV South	O	Burun West (B)	289.51	AM-PM Global Network Limited	Contracted
11	IV South	O	Burun (B)	317.57	Afri-International Project & Consulting Limited	Not Yet Contracted
12	IV South	O	Sheretti Cheche (B)	343.03	Bolmus Nigeria Limited	Not Yet Contracted
13	IV South	O	Waru Pozema (A)	357.93	Rosehill Group	Not Yet Contracted
14	IV South	O	Waru Pozema (B)	317.8	Waru Pozema District Infrastructure Company Limited	Not Yet Contracted
15	IV South	O	Burun West (A)	343.07	Deepearth Engineering Limited	Not Yet Contracted
16	IV South	Q	Bude West 'A'	330.84	Dozzy Oil & Gas Limited	Not Yet Contracted
17	IV South	Q	Jaite 'A'	227.45	Uraga Real Estate Limited	Not Yet Contracted
18	IV South	Q	Bude 'A'	239.53	M. I. Solaris Industries	Not Yet Contracted
19	IV South	Q	Bude 'B'	240.95	Nice Corporate Services Limited	Not Yet Contracted
20	IV North	-	Gwagwa	841.12	Gwagwa Concession Limited	Not Yet Contracted

Source: prepared by the JICA Study Team base on the EPRS's material
Note: The districts highlighted with orange colour shows the ones contracted.

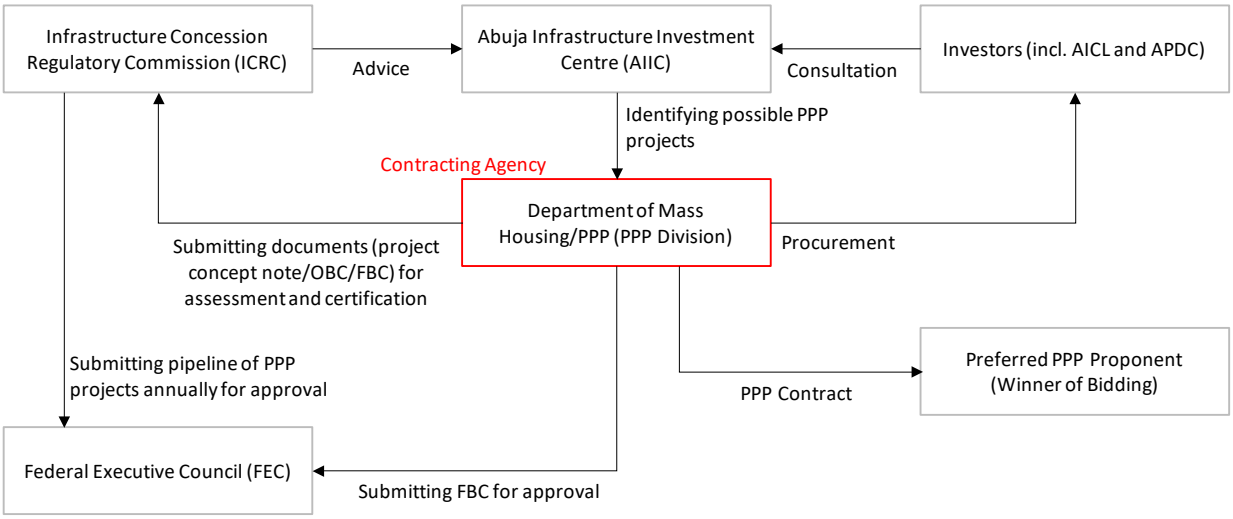
The result of the interview with AIIC in charge of this initiative shows that the implementation is suspended due to political issues and risks of execution that the private companies feel under the current situation. The private companies are willing to take a legal action against the government towards resumption of this initiative.

Mass media also reported that there seemed to be a negative opinion in the FCTA about covering too many target areas at once (It should have been expanded depending on the results of the implementation in several districts first) (source: Daily Trust February 7, 2016, "Senate unveils anomalies in FCT Land Swap").

Therefore, it can be considered that further expansion of the Land Swap Initiative will be judged after seeing the implementation results in the existing target areas.

5.2.2 Current Situation of PPP Projects

PPP projects implemented in each state are under the jurisdiction of state-level PPP units. For implementation of projects through PPP, ICRC Certificate and FEC's approval are required at the time of proposal and contract. Each state establishes a PPP unit and enacts PPP laws as necessary. In the FCT, the department corresponding to this PPP unit is the Department of Mass Housing/PPP, FCDA. Figure 5.2.5 shows the organizations related to PPP project implementation in the FCT. The Abuja Infrastructure Investment Centre (AIIC) as an organization that fulfils the same function as ICRC in FCT and is in charge of general investment promotion. AIIC gathers a wide range of information on investment from the private sector and distribute the information towards project implementation to the Departments of Mass Housing/PPP for PPP projects and related departments for other private investments.



Source: prepared by the JICA Study Team based on the interview with Department of Mass Housing/PPP

Figure 5.2.5 Implementation Structure of PPP Projects in the FCT

Table 5.2.5 and Table 5.2.6 show the number of post- and pre-contract projects as of January 2019, and the status of PPP projects in the FCT, respectively. Both the tables are prepared based on the project lists publicized by ICRC on the website, but considering the situation of information gathering, some projects seem not to be included in those lists. Besides, the ICRC's lists do not include the mass housing scheme and land swap initiative that have been executed in the FCT (refer to (3) and (4) of this sub-section for these schemes). As shown in Figure 5.2.5, Nigeria has the largest number of PPP projects in the port sector, followed by the energy sector. There are many projects in the urban development sector in the FCT. Considering the mass housing scheme and land swap initiative which are not covered in the ICRC's lists, it can be said that the urban development including housing development is the sector most encouraged the private sector participation in the FCT.

Table 5.2.5 The Number of PPP Projects in Nigeria by Sector (As of January 2019)

Sector		Post-contract		Pre-contract		Total	
		Whole Country	FCT	Whole Country	FCT	Whole Country	FCT
Transport	Ports	27	-	18	-	45	0
	Roads	-	-	1	1	1	1
	Railways	-	-	1	1	1	1
	Airports	2	-	6	-	8	0
	Logistics	7	-	-	-	7	0
Environment/Water	Environment	-	-	2	-	2	0
	Water					0	0
Information & Telecommunications	ICT	-	-	1	-	1	0
	Telecommunications	2	-	-	-	2	0
Energy	Energy	3	-	20	1	23	1
Urban/Housing Development	Urban Development	1	1	13	6	14	7
	Housing Development	1				1	0
Health Care		1	1	9	1	10	2
Construction of Public Facilities		3	-	6	1	9	1
Education		-	-	12	1	12	1
Other		4	-	18	2	22	2
Total		51	2	107	14	158	16

Source: prepared by the JICA Study Team based on the ICRC's lists

Table 5.2.6 PPP Projects in the FCT (As of January 2019)

Stage	Project	MDA	Sector
Post-contract	Concession for the operation, management and provision of primary, secondary and tertiary health care at Garki Hospital Abuja	FCTA	Health Care
	Concession for development of engineering infrastructure for Katampe District, Phase II (FCT-Abuja)	FCDA	Urban Development
Pre-contract (Project development and Procurement)	IGR Automated Platform for AEPB	FCTA/AIIC	Urban Development
	Federal Ministry of Industry, Trade and Investment Abuja Head Office Building	Federal Ministry of Industry, Trade and Investment	Construction of Public Facilities
	Abuja Medical Mall/City	Federal Ministry of Health	Health Care
	Automated parking centres (including construction)	FCDA	Urban Development
	Development of new towns in Abuja at Kwali and Bwari Area Councils	FHA	Urban Development
	Athletes hostel, Abuja	Federal Ministry of Youth and Sports	Other
	Development of National Council for Arts and Culture (NCAC) 's land (culture and arts theatre, office development for NCAC, conference and event exhibition hall and shopping mall)	Ministry of Information and Culture	Other
	Development of students hostel at University of Abuja	Federal Ministry of Education/University of Abuja	Education
	Small hydropower embedded power from the Wupa water treatment plant effluent discharge	FCT/AIIC	Energy
	ONEX through Mpape-Gurku-Ado/Gurku-Nyanya in FCT	FCTA	Transport
	Light Rail Lot 2 PPP Project	FCTA	Transport
	Development of CMD Headquarters, Abuja	Centre for Management Development	Urban Development
	Development of multipurpose facility at National Stadium, Abuja	Federal Ministry of Youth and Sports	Other
	Development of FHA shopping complex, Gwarinpa, Abuja	FHA	Urban Development

Source: prepared by the JICA Study Team based on the ICRC's lists

The Federal Housing Authority (FHA) also promoted the development of housing projects through PPP, that are not included in the ICRC's lists. One example is the FHA's PPP housing development project (Apo Hill Residence) in the FCT. Picture 5.2.1 shows the situation of Katampe District (the northern part of Phase II, FCC), which is one of the target areas for basic infrastructure development through PPP, and Apo Hill Residence (the middle of eastern part of Abuja Municipal Area Council) where housing development using PPP scheme by FHA is underway.

Katampe District

Apo Hill Residence

Source: photos taken by the JICA Study Team

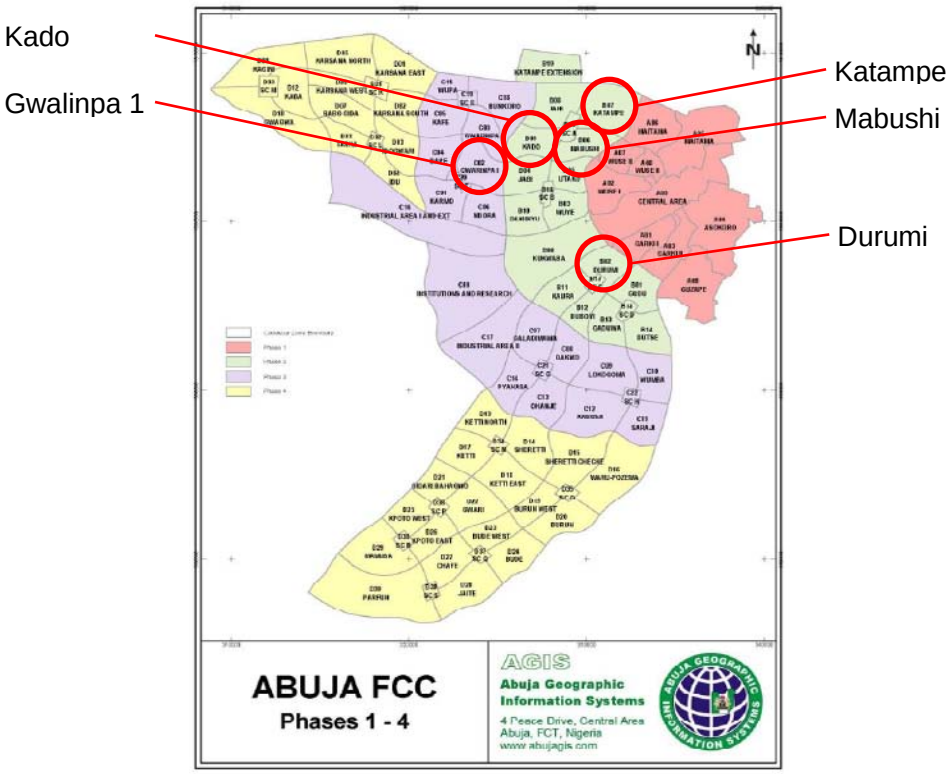
Picture 5.2.1 Current Situation of PPP Project Sites in the FCT (Basic Infrastructure and Housing Development)

Table 5.2.7 shows the PPP project plan in the FCT listed in the pipeline for 2016-2017, that are at pre-contract stage. The "Abuja District Infrastructure Project, Mabushi District" is similar to the post-contract project, "Concession for development of engineering infrastructure for Katampe District, Phase II (FCT-Abuja)". Five districts, Katampe, Mabushi, Kado, Gwalinpa 1, and Durumi, were selected as target areas for the district development through PPP, and Katampe District was selected as the first district and pilot site for the infrastructure development through PPP (Figure 5.2.6). However, due to absence of an appropriate financial market environment for continuing the project, the private business operator was unable to continue the project in Ktampe as they implemented up to 23% of the total development with the PPP contract. Table 5.2.8 shows the outline of the PPP project in Katampe District. The district development through PPP at five locations has already been approved by the Federal Executive Council, but the result of Katampe District project seems to be not a good practice. Therefore, the project in Mabushi District shown in the ICRS's pipeline cannot be implemented. According to the interview with the Department of Mass Housing/PPP, which is in charge of the implementation and management of PPP projects within FCT, the failure of Katampe District project had a negative impression on the district development through PPP to stakeholders. Therefore, a negotiation with the private business operator is in progress to resume the project in Katampe District before proceeding with the projects in other districts.

Table 5.2.7 PPP Projects in the Pipeline in the FCT (2016-2017)

Project	MDA	Sector
Development of dual carriage way from Outer Northern Express Way (Murtala Mohammed Way, Abuja) to ease congestion on Nyanya Road and surrounding axis	FCDA	Transport
Development of Abuja Mass Transit Rail Lot 1A and 3 Project	FCTA	Transport
Development of Abuja Light Rail Lot 2 Network route	FCTA	Transport
Abuja District Infrastructure Project, Mabushi District	FCDA/FCTA	Urban Development
Abuja Mass Transit Railway Lot 2 (Red Line)	FCDA/FCTA	Transport

Source: prepared by the JICA Study Team based on the ICRC's lists



Source: prepared by the JICA Study Team based on the map of AGIS

Figure 5.2.6 Target Districts for Development through PPP

Table 5.2.8 Outline of PPP Project in Katampe District

PPP Developer	Denshanger Project Limited
Project Cost	61,194,747,645 Naira (USD 170million)
Project Period	Contract: October 2010 Period: 60 months after financial close
Components	Design, finance, construct and transfer of infrastructure (roads, storm water drainage network, water supply network, sewage network, electrical distribution network, and telecom ducts)

Source: ICRC

The following are the lessons learned from the implementation of PPP projects in Nigeria (source: ICRC, "Nigeria: The Most Dynamic PPP Market in Africa? ", February 2010):

- Finance is a vital requirement, but a poorly prepared projects will ultimately fail. Experienced advisers are needed.
- PPP is not a contract but partnership. It is necessary to ensure that there is a conducive operating environment, such as risk balance, capacity in government and transparent and competitive procedure.
- Agency responsible for implementation must take ownership and responsibility from the inception of PPP project.
- Engagement should include all stakeholders that will be directly or indirectly affected.
- Political Leadership (not interference) is what is needed in a PPP environment.

According to the interview with the Department of Mass Housing/PPP, the following are pointed out as issues to be addressed on execution of PPP projects in the FCT:

- Capacity development of players in both public and private sectors to understand the complicated procedure of project implementation

- Improvement of business environment such as development of financial market suitable for the PPP project implementation
- Stabilization of the macro economy, by, for example, risk reduction in foreign exchange

In addition to the above-mentioned points, the interview result with Urban Shelter Limited illustrated the necessity for considering another issues on PPP such as taking long time for land acquisition process, imposing multiple taxes, and charging high interest rate on bank loans.

5.2.3 Current Situation of Development Activities by Private Sector

In addition to the PPP projects and the Land Swap Initiative shown above, some private sector projects shown in Table 5.2.9 are being implemented within the FCT.

According to the interview with Abuja Investments Company Limited (doing real estate development and lease and facility management, giving advice to private investors, etc.), a development company 100% owned by FCTA, private investors are interested in high density use within the FCC, because of the following situation:

- There are areas that have not yet been developed in the FCC
- There are areas where there remains unused areas even though the districts are being developed
- Satellite towns are less attractive because the public transportation system between the FCC and the satellite towns planned in the AMP has not been developed.

The "Abuja City Report, September 2016" of JLL (Jones Lang LaSalle IP, Inc., Headquarters in the USA), which provides real estate consulting and real estate market research services, stated that although there were development plans of private companies to invest in real estate development in the FCT many projects were put on hold until more certainty is gained around the macroeconomic challenges faced by the country. This report also pointed out that the real estate market in the FCT is characterized by the fact that office demand is predominantly occupied by the government agencies. The office demand for the private sector can be found mainly in Lagos because of Nigeria’s economic hub. Therefore, the lack of office demand is not driving significant development activity in the FCT. Picture 5.2.2 shows the current situation of the residential and office buildings constructed in Phase 1 of the Abuja World Trade Centre by the investment of Churchgate Group. Originally it was scheduled to open in 2013, but the construction is still ongoing, and the opening time is not clear.

According to the interview with a private company participating in the Land Swap Initiative, many of the projects in which the private sector participates are high- and middle-end housing and office developments. Unless government support is provided, land for the development is procured from the private sector with high price and final sales prices will also increase. Private companies are interested in urban development, but most of them are for investment within the FCC.

Table 5.2.9 Examples of Development by the Private Sector in the FCT

No.	Project	Outline
1	Abuja Industrial Park	• Development of industrial estate with 250 ha • 177 plots • Infrastructure investment of 200 million US dollars • By Zeberced
2	Abuja City Centre	• 21 ha in CBD • Mixed use of hotels, condominiums, offices, shopping malls, etc. • Investment of 1.5 billion US dollars • By Chicason Group
3	Abuja World Trade Centre	• Complex development in the former lot of Bakassi market, CBD (6.102ha) • 24-storey commercial and residential buildings, hotel and shopping mall • By Churchgate Group
4	Centenary City	• Regional development along Airport Road (1,200 ha) • Designated as Free Trade Zone • By Centenary City Developers FZE
5	Housing Development	• Abuja @ 30 Housing Project • Green Ares Estate • Fairway Estate Games Village
6	Market Development	• Mabushi Ultra-Modern Market • Wuye Ultra-Modern Market • Kaura Modern Market
7	Commercial Development	• Jabi Lake Mall • Novare Gateway Mall • Maitama Mixed-Use Development • Asokoro City Mall

Source: prepared by the JICA Study Team based on FCTA, “Progress Report on Policies, Projects and Programmes 2001-2014”, JLL,”Abuja City Report, September 2016”, and information on the project websites

Abuja World Trade Centre Phase I Development (left: office, right: residential)

Residential Building of Abuja World Trade Centre

Source: JICA Study Team

Picture 5.2.2 Example of Private Sector Development in the FCT

As also shown in Table 5.2.1 which summarizes the main items that are required for promoting private sector participation in infrastructure development, insufficient financial market and government commitment, and the need to improve the legal system (in particular the Land Use Act thought to be hindering private investment) can be considered as major challenges for promotion of private sector participation in infrastructure development from the standpoint of private investors. The private sector also pointed out that if the government aims to supply housing at affordable prices for low-income groups, it is better for the government to implement basic infrastructure development by public sector. When private sector implements

the infrastructure development, the cost is passed on to the selling price of the housing. But when the government conducts infrastructure development, the house price can be kept lower.

5.2.4 Situation of Private Sector Participation in District Development within the FCC

Table 5.2.10 shows the situation of private sector participation in district development within the FCC. The forms of participation can be categorized into four types: district development through PPP, Mass Housing Scheme with PPP, participation in the Land Swap Initiative, and Private Investment Initiative (private-led investment in district development). There are 109 districts in the five phases (Phase I to Phase V) of the FCC. The number of districts in which the private sector participates in district development in various projects is 30 (28% of the total).

Table 5.2.10 Participation of Private Sector in District Development within the FCC

FCC	Number of Districts	PPP		Land Swap Initiative	Private Investment Initiative
		Development Project	Mass Housing Scheme		
I	10				
II	21	1	4		
III	23		10		
IV	43			13	
V	12				2
Total	109	1	14	13	2

Source: prepared by the JICA Study Team based on the material provided by EPRS, Ibrahim Usman Jibril and Kwankur Tatte Garba, "The Challenges of Housing Development and Needs in Abuja Nigeria"

5.2.5 Consideration and Suggestions for Further Planning and Implementation

In order to accelerate the urban development in FCC and satellite towns, private sector participation is still a driving force because of budget limitation of the FCT Administration. However, main interests of private investors are high-end residential and retail development in FCC, especially in Phase I and II. Commercial development for office stock is still limited because the office market in FCC heavily relies on government-related businesses. Compared to the demand of private investment in FCC, satellite towns development is less attractive for private investors, except for the area near Phase I of FCC. From the perspective of private investors, the following are examples of issues to be particularly improved, but there are also some areas that cannot be dealt with within the framework of urban planning.

Matters required to promote realization of the plan	Possibility to be addressed in Urban Planning	Measures and Administrative Level	
Macroeconomic stability (Risk reduction in foreign exchange)	Impossible	Financial Policy	Federal Level
Improvement of financial markets	Impossible	Financial Policy	Federal Level
Granting incentives for entering into urban development businesses (Relaxation of tax rate etc.)	Possible	Support Measures	FCT Level
Improving administrative capacity on urban development project implementation (Shortening the period required for land acquisition procedures, etc.)	Possible	Institutional Framework	FCT Level

The following can be considered as the issues to be tackled for realizing the integrated development of FCC and satellite towns, as part of AMP's review:

- Examining land-based financing scheme suitable for conditions of Nigeria based on evaluation of existing district development projects in FCC through PPP and private investment initiative

- Examining possibility of integrated development of FCC and satellite towns through private investment initiative such as granting development rights in CBD for high density use or urban renewal instead of investment in primary infrastructure development in satellite towns
- Examining public service delivery and housing supply scheme for medium- and low-end groups through utilization of CSR and CBD's asset value
- Promoting industrial development to attract investments other than those for meeting conventional needs of government agencies

5.3 Relationship between Urban Development Projects and Plans in the FCT

5.3.1 Relationship with AMP and Detailed Plans

The AMP formulated in 1979 is a plan showing the policy, planning contents and specifications for guidance of organised land use and appropriate urban facilities development in the FCT. As detailed plans for actually implementing the AMP, it is necessary to formulate (1) land use plan, (2) plan of urban facilities maintenance (sector plans for urban transport, water supply, sewerage and drainage, solid waste management, and power supply), (3) plan of urban development projects. The detailed plans for land use and water supply are the ones formulated after the implementation of the AMP. Drawings of land use planning have been prepared and used to issue licenses and giving approvals for development and building construction and to enforce the regulations of licensing and approval stipulated in the Nigerian Urban and Regional Planning Act.

The Mass Housing Scheme and the Land Swap Initiative was started in 2000 and 2013, respectively (the guidelines for Mass Housing Scheme prepared in 2009), aiming at infrastructure development and housing supply. The enforcement of aimed at infrastructure improvement and housing supply is in 2000 (enforcement of guidelines is 2009), enforcement of is 2013. Those are so-called urban development projects that construct primary infrastructure and housing in an integrated way.

About 40 years have passed since the AMP was formulated. The JICA Study Team recognized that planning for the guidance of organized land use (urban development renewal projects) has been lagged behind because squatters appear everywhere in the FCT and urban areas are formed by specific resident groups during the period. PPP was introduced to the implementation of the Mass Housing Scheme. PPP aims at enhancing the partnership between the public sector and private sector and utilizing private finance for infrastructure development (see Section 5.2.1). However, that is not a system operated with the urban planning to promote urban development projects. PPP is introduced to not only the urban development but also other development fields. Therefore, the JICA Study Team recognizes that PPP will apply only to the projects that are beneficial for private companies as one of the methods for realizing urban facilities and housing development indicated in the AMP.

5.3.2 Relationship with Urban Development Management

In Nigeria, based on the Land Use Act that came into effect in 1978, all the land has been made public. The urban lands are under the control of the FCT Minister (governors in the states), while the rural lands are under the control of local government areas (LGAs). For this reason, private companies need to pay land acquisition fees to the land administrator (FCT minister, governors in the states or LGAs) at first and get the right of occupancy from the land administrator to implement urban development projects

In the above-mentioned Mass Housing Scheme and Land Swap Initiative, the private companies are not required to bear the cost for land acquisition, but instead the government requested them to develop housing as well as primary infrastructure in the allocated plots. The private companies are given not the land ownership but the right of occupancy. However, they will be able to use the land for up to 99 years after getting the right of occupancy. In the case of a development project in the land where the right of occupancy has been already issued, converting the right holder is needed. In the target areas of the Mass Housing Scheme, there were lands where the right of occupancy has been issued (so called "brown field"). Therefore, development activities in some plots allocated were put on hold because converting the right holder did not go smoothly.

The private companies that acquired the right of occupancy on the allocated plots can conduct the project after proceeding the development application on land use and detailed design (see Section 5.1.3). There were some places where urban facilities indicated in the AMP were not developed because appropriate supervision by the administration was not carried out during the implementation period. In other areas where the private companies did not follow the planned land use, there were some plots where buildings were demolished and the sites were restored by the Development Control Department under the FCTA

After completion of the development, the private companies sold houses to end users with the price including land fee and building. The collected land fees were to be transferred to the land administrator. Most of the private companies participated in this scheme were not engaged in the real estate management after selling the houses.

Currently, the Abuja GIS under FCTA unifies the information of land registration (right of occupancy) for the lands within the FCC with GIS. As for the lands outside the FCC, Abuja GIS organizes the information on the right of occupancy only for planned residential areas designed based on the urban planning. The information for other areas are not organized.

Urban development projects are effective measures to guide organized land use. However, the JICA Study Team recognizes that solving all aspects of urban development management, such as land registration, conversion of right holders, introduction of PPP scheme and project monitoring, is needed.

5.4 Situation of Support from Other Donors

Table 5.4.1 summarizes the status of support from donors for private sector participation. The main support area of each donor is to strengthen the capacity of government agencies. Since it takes time to prepare and procure PPP projects, it is necessary to consider some risks. The process leading up to the PPP contract could be prolonged. The PPP contract could not be reached for the support including financing for PPP projects like the World Bank's "Public/Private Partnership Program".

Table 5.4.1 Situation of Support from Other Donors for Private Sector Participation

Donor	Situation
World Bank	• Public/Private Partnership Program ⇒Initially 115 million US dollars loan for PPP projects. Cancel of 85 million US dollars due to limited number of viable projects. Only 3 PPP projects were targeted (closed in June 2018. • Framework for Disclosure in PPPs ⇒Implemented from September 2016 up to April 2017. ”PPP Disclosure Diagnostic Report for Nigeria” prepared for suggesting improvement of transparency and accountability. ICRC’s website was development based on suggestions in this report.
Africa Development Bank (AfDB)	• 85 million US dollars loan to the Lekki-Epe Toll Road Project, first PPP project in the transport sector in Nigeria (implemented 53 million US dollars). *However, the State Government of Lagos bought back from the concessionaire in 2014. • 97 million US dollars loan to development of Lekki Port in Lagos Free Trade Zone through PPP • 250 million US dollars loan to Urban Water Reform and Port Harcourt Water Supply and Sanitation including examination of PPP options for operations • Implementation of training for government officials on PPP by African Legal Support Facility (ALSF)
Department for International Development (DFID)	• Support for developing the PPP policy, development of PPP units across Nigeria, including support to Lagos State Government in setting up and implementing a PPP unit and policy through Nigeria Infrastructure Advisory Facility (NIAF)

Source: prepared by the JICA Study Team based on the World Bank’s website information, AfDB, “PPP Project Development Support, Presentation at the 2nd Quarter PPP Unit Consultative Forum”, AfDB’s website information about projects in Nigeria, UK government’s website on support fir Nigeria, NIAF, “Overview of DFID Nigeria’s support through The Nigerian Infrastructure Advisory Facility- NIAF II & PPP Lessons Learned”

Chapter 6 Transport Sector

6.1 Sub Sectorial Master Plan and Relevant Projects

6.1.1 Transport Master Plan（Federal Government）

Table 6.1.1 shows the transport master plans by the federal ministries. Every local government including the FCT should respect these plans since they are placed at the top to guide all the development. For example, specific projects are listed up in the 25 years Strategic Plan for Railway Development (refer to Table 6.1.2), and the projects for the FCT are covered in the transport master plan of the FCT.

Table 6.1.1 High-level Transport Master Plan

Documents	Outline	Remarks
Master Plan for Integrated Transport Infrastructure (MITI)	Provided for the sake of integration transport infrastructures by Federal ministry of transport in 2002	Prepared by AS&P (Albert Speer & Partner) and Julius Berger Nigeria。Nigerian Institute of Transport Technology
25 years Strategic Plan for Railway Development	Parallel project, development of new standard gauge and rehabilitation / replacement for existing narrow gauge	Prepared by Team Group Ltd. Specific projects in the FCC are stipulated.
Aviation Sector Master Plan	Provide as acceleration strategy of Nigeria Vision 20:2020 for period 2011–2015, which contents plan of 22 airports and 25 runways	"National Civil Aviation Policy" by Federal Ministry Aviation, 2013
The 1993 Transport Policy for Nigeria (The 2003 Draft National Transport Policy document) (The 2008 Draft National Transport Policy document) (The 2010 Draft National Transport Policy document)	Provided as transport policies strategy. For example, theme in 2003 policy is "Integration", the one in 2008 is "Privatization"	Further information on International Journal of Development and Sustainability (ISDS), Vol.2, No.2, 2013
National Integrated Infrastructure Master Plan [NIIMP]	Investment plan of 3,000 billion USD for 30 years (2013-2043) (max investment 775million USD)	

Note: excluding maritime and inland transport
Source: JICA Study Team

Table 6.1.2 Specific Projects in the FCT in 25years Strategic Plan for Railway Development

Priority	Projects	Executing Agencies	Length	Cost (million USD)	
1	New Line Ovu - Warri	FMOT	22 km	225.6	10.3 million USD/km
2	New Line Abuja – Kaduna	FMOT	187 km	875.0	4.7 million USD/km
3	Coastal Line Benin – Calabar	FMOT	490 km	5,025.6	12.3 million USD/km
4	Abuja LRT Lot 1	FCT	45 km	755.2	16.8 million USD/km
5	Abuja LRT Lot 2	FCT	22 km	369.2	16.8 million USD/km
6	Abuja LRT Lot 3	FCT	18 km	408.5	22.7 million USD/km

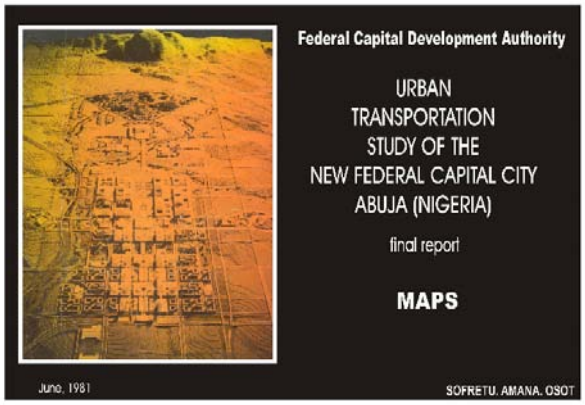
Source: 25 years Strategic Plan for Railway Development, MOT: Federal Ministry of Transport

6.1.2 Transport Master Plan（FCT）

A transportation master plan titled "Urban Transportation Study of the New Capital City Abuja, Sofretu, Amana Consortium, Osot Associates Consulting Engineers" (hereinafter referred to as "Transport M/P") was formulated in 1981 based on the 1979 AMP. The Transport M/P provided a detailed study of the transport plan outlined in Chapter 9 of the AMP, and hence consistent with the AMP and comprehensive urban transportation

master plan of the FCC. A study for the review and upgrading of the Transport M/P has started in 2016, and it is still underway.

The Transport M/P covers only area inside the FCC, and the plan of the entire FCT including the satellite towns outside the FCC shall be covered by "Regional Master Plan, by Doxiadis and associates". Only regional road network connecting the satellite towns and FCC, however, was considered in the Regional Master Plan.



Source: FCDA

Figure 6.1.1 Transport M/P

(1) Urban Transportation Study of the New Capital City, Abuja, 1981

1) Coordination with Urban Planning Concept

The basic concept of the transportation infrastructure layout in the FCC is set as follows in compliance with the upper level concept stipulated in the AMP, i.e. Neighbourhood Concept, and Efficiency / Flexibility targeted in the AMP

- Highway Grid System

Every development district (phase I - III) and/or an area defined as sector centre in the AMP shall be bounded by a highway network. The closed network system of a district / sector centre area is adopted to minimize car trips and secure safety by avoiding through traffic since majority of traffic generated / attracted by a sector centre is limited to inside as long as the neighbourhood concept works better.

- Dual Transit Ways

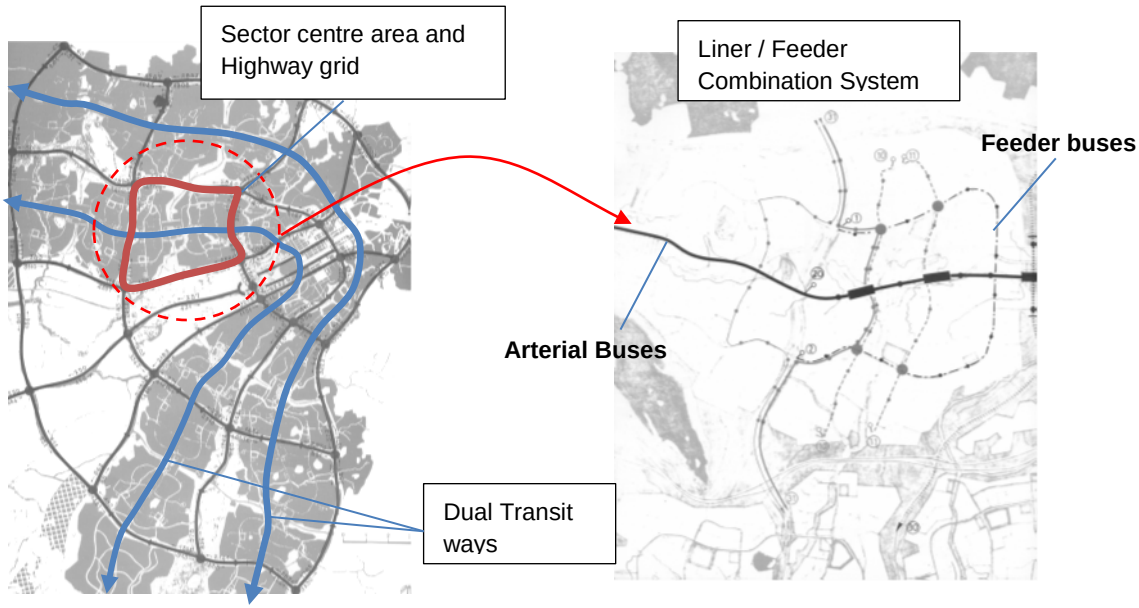
Each two transit way both north and south with connection to all sector centres from the CBD is planned along the development wings. Trips between sector centres shall be made by the transit ways.

- Trunk-Feeder Network System

The feeder lines shall be connected to the trunk lines at appropriate intervals so that almost all resident could access public transport within five minutes. The demand that may arise from the expansion of the city by increase of population may be addressed efficiently and flexibly by extending the trunk lines.

- Stage-wised Public Transport Upgrading

A transit corridor shall be upgraded depending on urban development and demand. Buses may serve in mixed traffic at the initial stage, but on excusive lane at the next stage. It may be later on changed to rail transit such as LRT or ordinary rail according to demand increase.



Source: Urban Transportation Study of the New Capital City Abuja

Figure 6.1.2 Image for Major Transport Infrastructure Concept

2) Target Area and Zoning

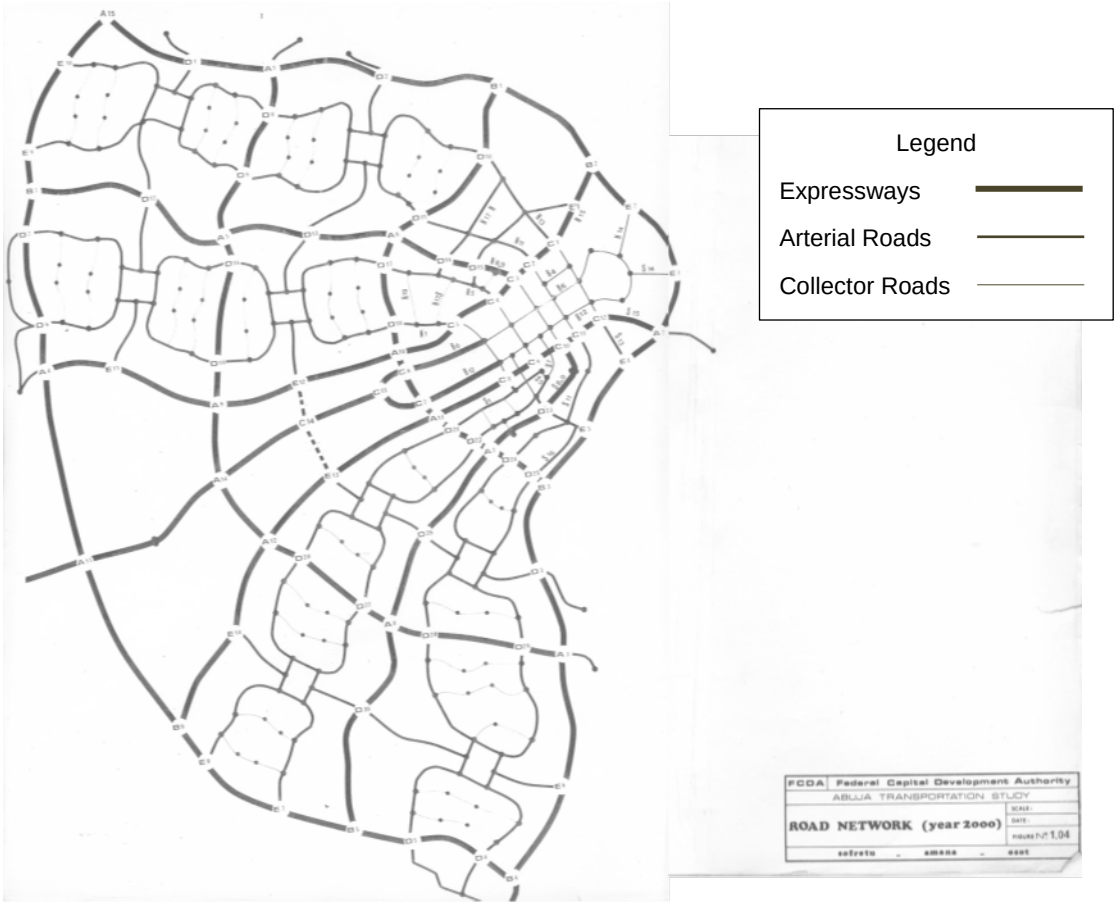
The target area covers phase I, II, III, and a part of phase IV, and the area is divided into 98 zones for further transport demand analysis.

Source: Urban Transportation Study of the New Capital City Abuja

Figure 6.1.3 Zoning of Target Area

3) Road Network

Trunk road network for phase I - III is as shown in Figure 6.1.4.



Source: Urban Transportation Study of the New Capital City Abuja

Figure 6.1.4 Trunk Road Network in the FCC (Phase I-III)

4) Right-Of-Way (ROW) and Typical Cross Section

Roads are classified into five categories. The proposed ROW and typical cross section for every road category are provided in the road design guideline. The actual ROW and cross section shall be specified in consultation with the URP, FCDA according to site conditions.

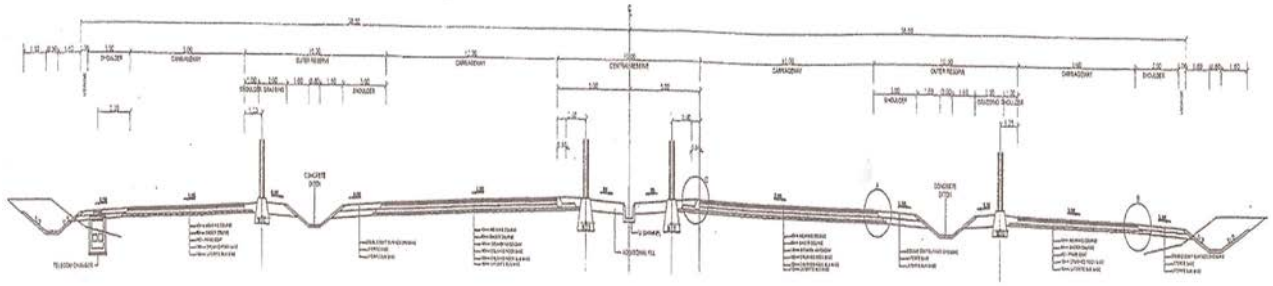
Table 6.1.3 Proposed ROW and Typical Cross Section by Road Classification

Classifications	Proposed ROW	Components of Cross Section
Expressway	60 m – 80 m	Service 2 lanes＋3 lanes＋median＋3 lanes＋service 2 lanes (total 6 - 10lanes)
Arterial Roads	45 m - 60 m	Parking＋3 lanes＋median＋3 lanes＋Parking (total 6 lanes)
Collector Roads	25 m – 45 m	Parking＋2 lanes＋median＋2 lanes＋Parking (total 4 lanes)
Minor Access Roads	10 m – 20 m	1 lane each direction (total 2lanes)
Local Street	10 m – 20 m	1 lane each direction (total 2lanes)

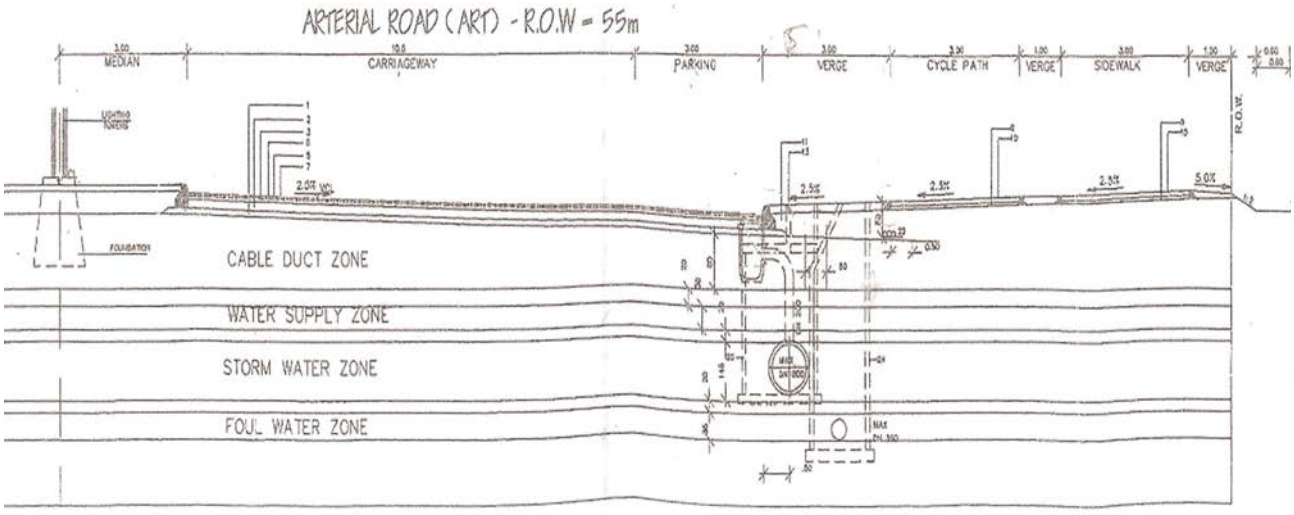
Source: JICA Study Team based on interview for URP and Engineering Services, FCDA

A typical cross section of each road category is show below. One of the features of the FCC roads is the provision of the parking spaces for arterial and collector roads since the FCC provides on-street parking spaces to meet the parking demand. On the other hand, parking on expressways is prohibited except for emergency cases as the FCT Road Transportation Regulation 2005 stipulates.

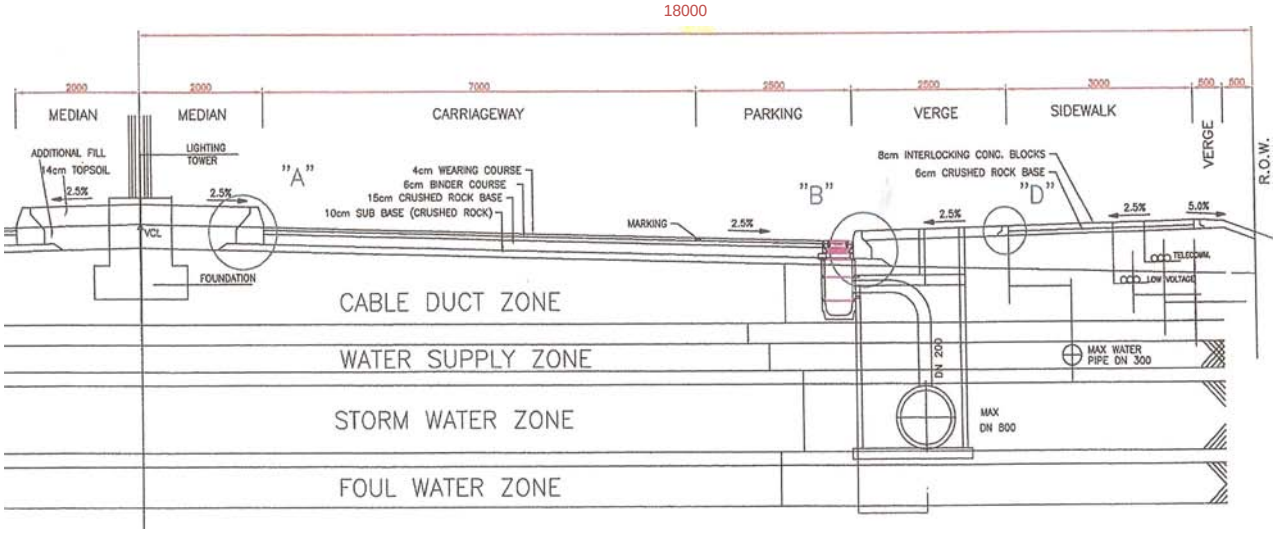
Expressway W=78m



Arterial Roads W=55m



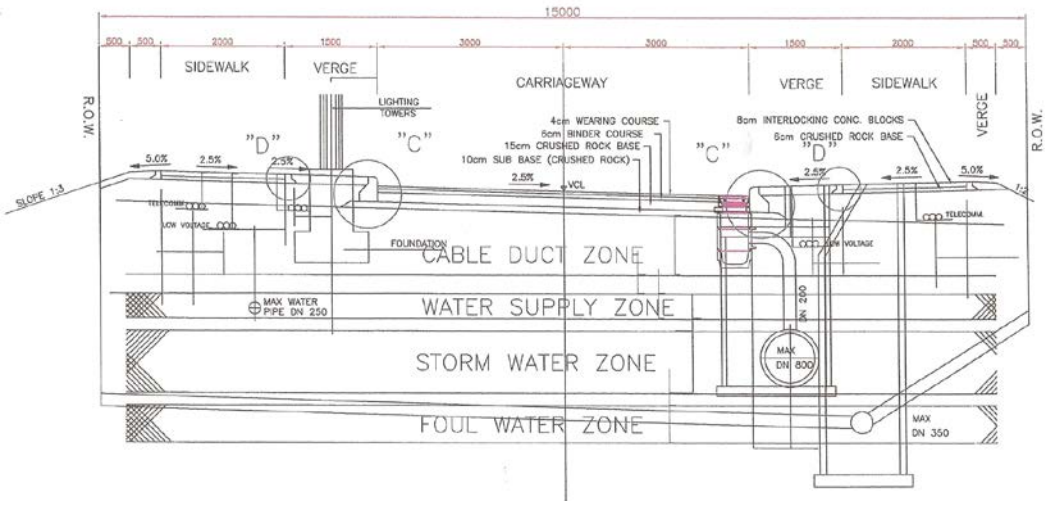
Collector Roads（ W=36m）



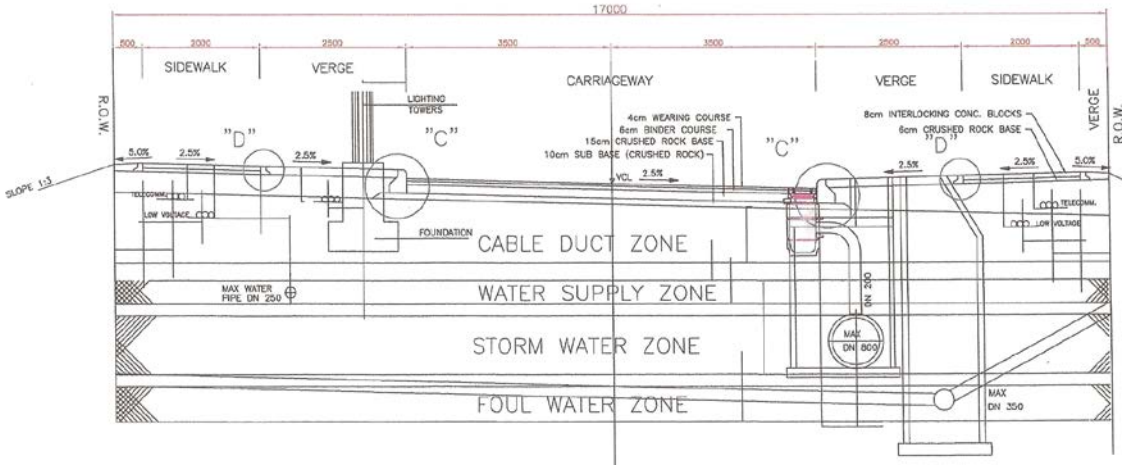
Source: Engineering Services, FCDA

Figure 6.1.5　Typical Cross Sections by Road Classification (1)

Minor Access Roads（W=15m）



Local Street（W=17m）



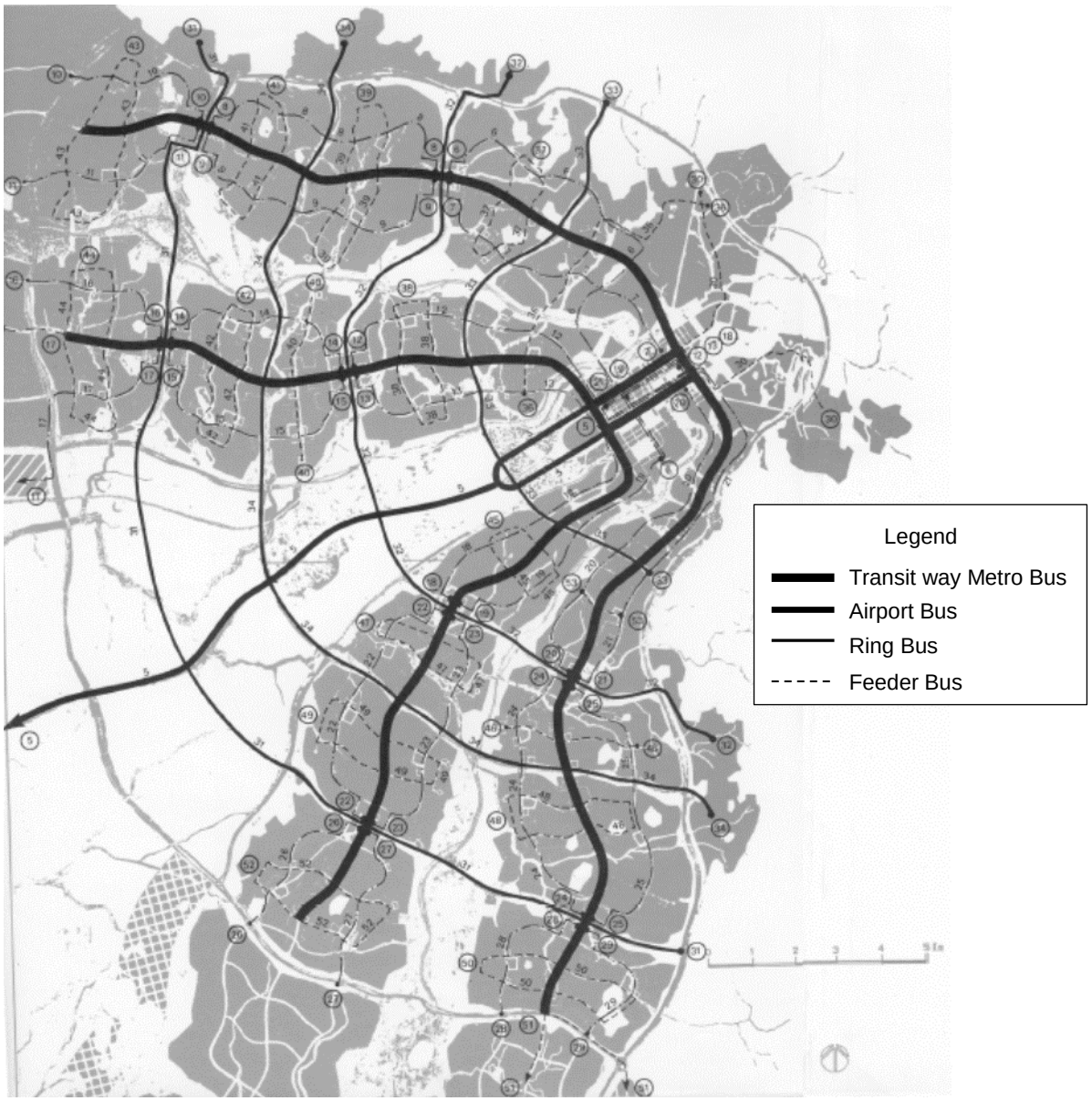
Source: Engineering Services, FCDA

Figure 6.1.6 Typical Cross Sections by Road Classification (2)

5) Bus Network

The basic framework of the bus network consists of trunk bus corridors (initial stage for public transport service) and feeder bus lines connected to trunk (airport access buses and ring buses are also considered as trunk bus services). If one block module is composed 1 sector centre, the transport service may be efficiently improved by adding modules to meet the increasing demand with the expansion of the city.

No trunk transit corridor, however, has been developed so far in the FCC, and the service hierarchy of trunk and feeder lines is yet be established.

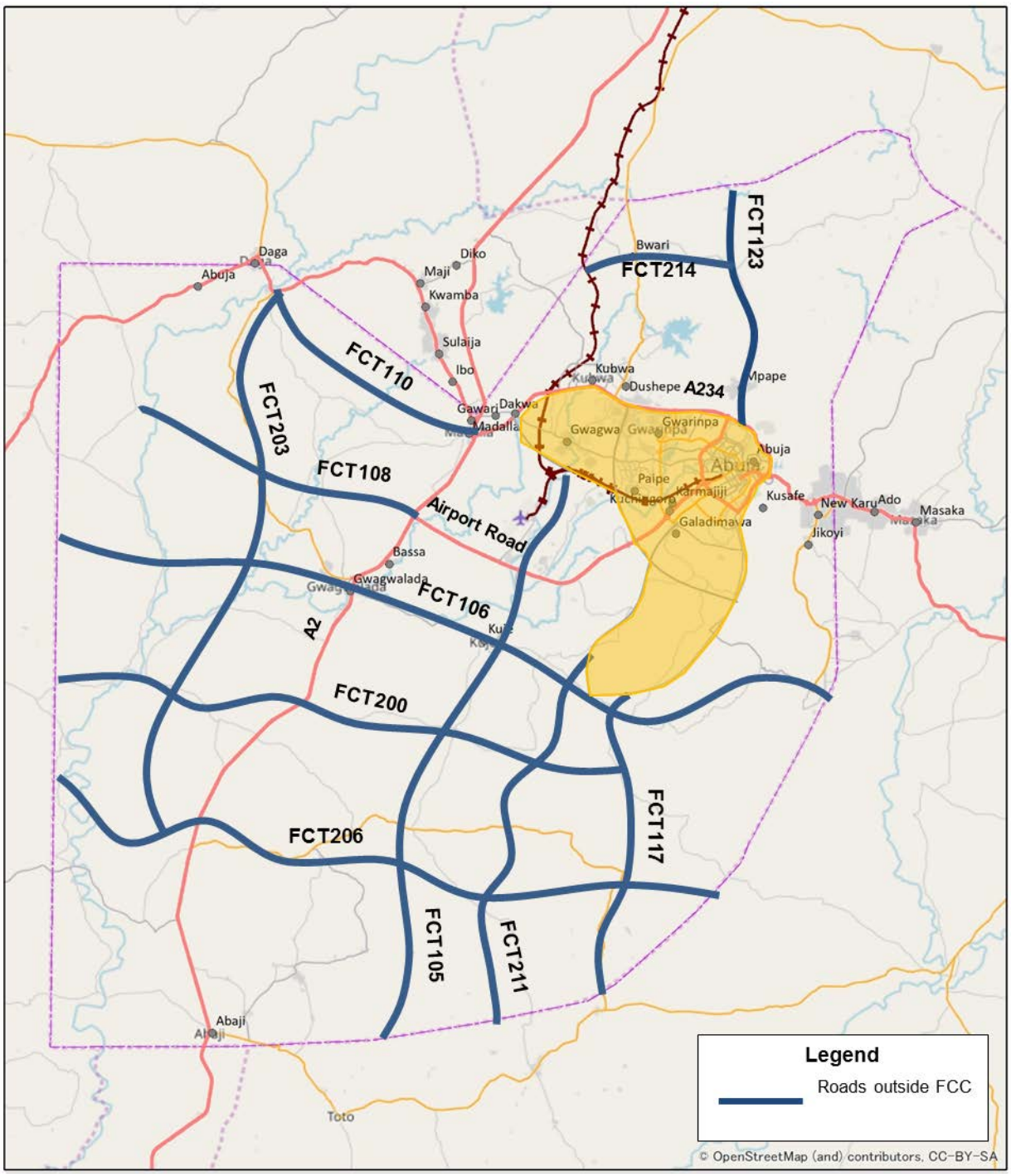


Source: Urban Transportation Study of the New Capital City Abuja

Figure 6.1.7 Public Transport Network in the FCC (Phase I-III)

(2) Regional Master Plan, 2000

The trunk road network planned in the Regional Master Plan is as shown in Figure 6.1.8. All the trunk roads in the FCT except the Federal road A2 and A234 are classified as FCT roads. Progress of these trunk roads development is quite low, and only the airport road is developed well. However, a public tender will be held for a part of the FCT 106 road forming the southern boundary of the FCC, and FCT 105 road which links the airport and some of within 2019 (interview survey with the Engineering Services of the FCDA).



Source: JICA Study Team based on Regional Master Plan

Figure 6.1.8 Trunk Roads Network outside FCC

(3) Review of Urban Transportation Study and Transportation Master Plan (On-going)

The review and upgrading study of the Transport M/P (hereinafter referred as “the review study”) has been on-going under the Transport Secretariat (hereinafter referred as “the TS”) since 2016. The review study has been carried out by a local consultant, Kuntech and Associates, under the contract with the TS. The scope of the review study is as shown below and approximately 50% of the work has been completed:

- Review of the AMP
- Review of the Transport M/P
- Field traffic survey and analysis *1

- Inventory survey for transport infrastructures
- Traffic demand analysis
- Feasibility study for priority corridor project and upgrading of the Transport M/P

The target year of the review study is 2039, which is 20 years later from the present. According to an interview with the local consultant, it will take more time to complete the review study, until the end of the year 2019 at least.

Table 6.1.4 Field Traffic Survey and Explanation *1

No	Survey	Explanation
1	Road inventory survey	Inventory of geometric, traffic, and damage on infrastructure for designated 18 trunk roads in the FCC.
2	Traffic count on roads by classifications	Counting by classifications on designated 11 screen lines in the FCC.
3	Traffic count at junctions by classifications	Counting by classifications at designated 35 junctions in the FCC
4	Households interview survey	Interview of person trip pattern for residential in phase 1 -3. Random sampling method for every district was adopted.
5	Interview survey for public transport users	Interview of public transport user's mobility, origin-destination, travel time, fare, etc. at designated 10 terminals in the FCC
6	Travel time survey	On-board travel time and travel speed measurement by surveyors for major routes

Source: JICA Study Team based on interview for Transport Secretariat and references

The review study is to revise the 1981 Transport M/P. The zoning system which specified 98 zone in the FCC in FCC has been updated in the review. The review has divided the FCT into 135 zones, including 115 zones in the FCC. Whilst the study area is expanded to cover the whole FCT, the field traffic survey was conducted only in phase 1, 2, and 3 area. As a result, there are concerns on the on the traffic condition of the satellite towns since their analysis is based on secondary and not primary data.

(4) Public Transportation Concept for Abuja's Metropolitan Area, 2005 - 2008

In this concept, railway based new mass transit lines were proposed for airport access and for commuting in the FCC. Therefore, the concept of dual transit way, i.e. buses at initial stage and railway at a later stage, may be changed. Eight satellite towns (Nyanaya, Karu, Karshi, Kuje, Kusaki Yangi, Kubwa, Gwagwalada, and Suleja) are supposed to be connected through mass transit. The mass transit system for Nyanya area was not specified as railway; however, it seems that BRT system was considered at that time, as an urgent solution was required.

Source: Public Transportation Concept for Abuja's Metropolitan Area, AS&P, 2009

Figure 6.1.9 Abuja Mass Transit System

Under such new public transportation concept, quantitative goals of all kinds of transport infrastructures / services in the FCT were proposed as "AbuTrans Initiative" as follows.

Table 6.1.5 Development Goals for Public Transport Services

Transport infrastructure	Development goals	Remarks
LRT, Railway	286 km in total	Guided system
BRT	66 km in total	Major 3sections＋α
Bus services in the FCC	Service improvement for phase 1 and 2 areas	1000 buses are required
Parking	Spaces for 33,000 cars	Around bus/railway stations

Source: Characterization of Current Transportation Challenges in the Federal Capital Territory, Nigeria 2012

(5) Planned Relevant Specific Projects

Construction of LRT Lot 3 was completed in January 2018 and studies listed below were conducted for next public transport projects. BRT projects had been planned for seven corridors in total including 3 priority routes (Masaka area, Suleja area, and Airport area), of which CBD – Masaka route is expected to be realized earlier. The project details of BRT between CBD and Masaka area are described on the next page.

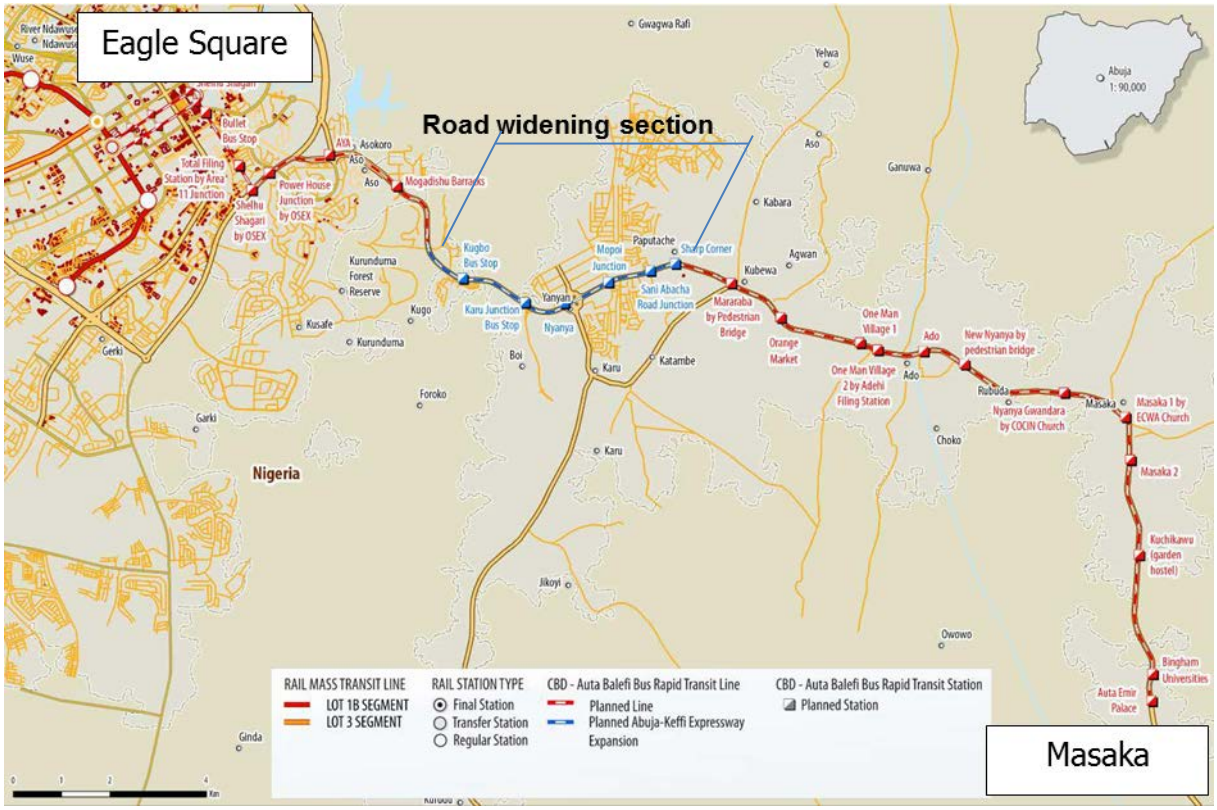
- FCT Bus Demand and Accessibility Study, 2011
- Legal and Regulatory Review of Bus Mass Transit, 2011
- Viability Study for the Operation of BMT on the CBD – Masaka and CBD to Suleja Route, 2014
- Concept Design for the Bus Mass Transit Infrastructure on the CBD – Masaka & CBD to Sulaja Route, 2014
- Consultancy Services for the Feasibility Study and Conceptual Design of Lots 4, 5, and 6 of the Abuja Rail Mass Transit System, 2014
- Consultancy Services for the Review of Conceptual Design and Available Studies for a Long Term Integrated Abuja BRT System and Detailed Design for the Pilot Corridor, 2017

Source: Reference of TS and Kuntech and Associations

A pilot BRT project will be introduced in the CBD – Masaka section having a total length of about 30 km. Starting point of the CBD side is the Eagle Square (however, starting at AYA junction or transport centre is being considered) and depot is planed around Masaka area. Even though A234 highway (Abuja–Keffi Expressway) with 10 lanes is secured for the pilot BRT, the number of lanes gradually decreases to 4 without

median strip. A large number of passengers are expected to use the section between CBD and Nasarawa border after the BRT introduction, and widening a section of the expressway is required.

A total of 23 bus stops are planned, and Nyanya bus stop is supposed to be improved for integrated transport interchange. It is considered that an exclusive bus lane will be provided either in the road centre or on the road side. Expected passenger volume is not announced officially as of January 2019.



Source: Interim report 1, Consultancy Services for the Review of Conceptual Design and Available Studies for a Long Term Integrated Abuja BRT System and Detailed Design for the Pilot Corridor

Figure 6.1.10 Proposed Section of BRT Pilot Project

Eagle Square in CBD

Nyanya Bus Stop

Picture 6.1.1 Proposed location for the introduction of the Pilot BRT

6.2 Ministries, Authorities, and Mandate

Ministries / authorities and its mandate are as follows.

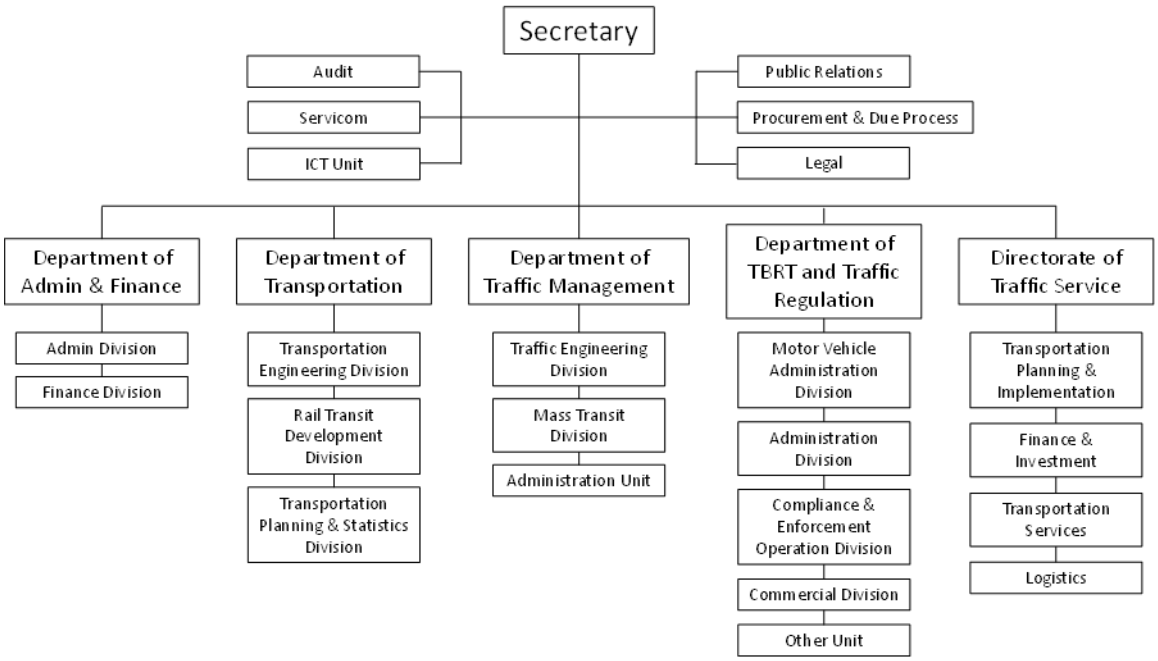
6.2.1 Planning

(1) Transport Secretariat（TS）, FCTA

TS responsibilities are developing conceptual planning for road network, planning and designing of all kind of transport infrastructures and services except road infrastructure, regulating and issuing permissions for transport businesses and operations. The design and implementation works of road infrastructures are handed over to the Design and Evaluation Department, City Infrastructure (North, South, Central) of Engineering Services Department, FCDA. The design of transport infrastructures except roads is controlled by the TS by sub-contracting them to local consultants. The TS regulates the public transport and transport business besides issuing permissions for operators.

As shown in Figure 6.2.1, TS consists of 5 line departments. The Department of Transportation formulates various plans from technical aspects, including the planning of the railway sector. The Department of BRT and Traffic Regulation is responsible for the BRT system, and develops regulation needed to operate the BRT system, which is a new transportation system in the FCT. The Department of Traffic Management controls and maintains parking facilities, traffic lights, and mass transit system. The Directorate of Road Traffic Service controls public transport operators (bus and taxi) and implementation of public transport project including finance schemes.

There are several relevant organizations to the TS, and VIO (Vehicle Inspection Office), one of the key organizations which manages database of vehicle inspection and registration in the FCT, is among them. There are also several road transportation associations (National Union of Road Transport Workers, National Association of Road Transport Owners, Road Transport Employers Association of Nigeria, Road Transport Employees Association of Nigeria, etc.) established in the FCT and the TS mandated them to issue license to operate public transport and/or transport business in the FCT.



Source: TS documents

Figure 6.2.1 Organogram of TS

(2) Urban and Regional Planning（URP）, FCDA

The URP advices on planning / design decision related to the road infrastructure from the ROW aspect, since they control all land use plans in the FCC. Actually, The URP has only a few transport engineers, and their participation in transport technical issues is limited. In some cases, the URP proposes certain transport oriented project, for example, for solving bottle parking issue in the FCC or ROW issues based on the available space.

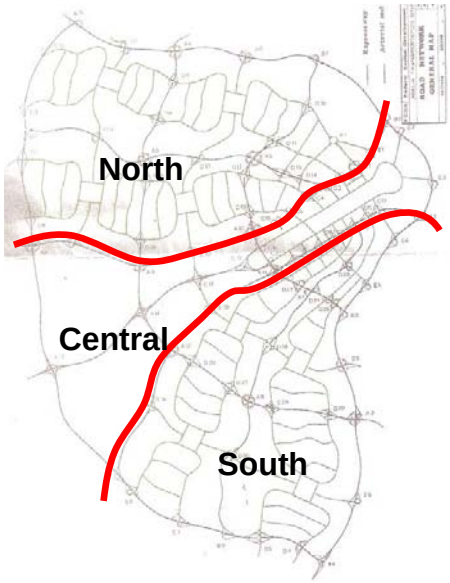
Table 6.2.1 Responsibility by Transport Infrastructure / Services

Infrastructure / services	Planning	Design / Implementation	Operation / maintenance	Permission
Roads (FCC)	Transport Sec. URP (ROW)	Design & Evaluation Dep. Engineering Services, city infrastructure sec.	Facility Management Dep. AMMC	Not applicable
Roads (Outside FCC) Primary Rd.	Transport Sec. URP (ROW)	Design & Evaluation Dep. Engineering Services, Regional roads sec.	Facility Management Dep. AMMC	Not applicable
Roads（Outside FCC, FCT）Under Primary Rd.	Transport Sec. URP (ROW)	STDD	STDD	Not applicable
Buses (FCC)	Transport Sec.	(Transport Sec., in any)	Abuja Urban Mass Transit Company, Others (Individual basis)	Transport Sec. Relevant Transport Associations
Buses (Outside FCC, FCT)	Transport Sec. & Area council	(Transport Sec., in any)	Abuja Urban Mass Transit Company, Others (Individual basis)	Transport Sec. Relevant Transport Associations
Buses (Intercity)	FMOT	(FMOT, in any)-	Individual	FMOT Relevant Transport Associations
Taxi (FCC, FCT)	Transport Sec.	-	Individual	Transport Se Relevant Transport Associations
LRT (FCT)	Transport Sec.	Transport Sec.	CCECC with concession	NRC
LRT (FCT & Satellite towns)	Transport Sec. & Area council	Transport Sec.	Not case	NRC (probable)
Railway (Intercity)	FMOT	FMOT	NRC	FMOT
Airport	FMOT	FMOT	FAAN	FMOT
Logistics (Transport, FCT)	Private	Private	Private	Transport Sec.

Source: JICA Study Team based on interview survey for TS
Note: FMOT: Federal Ministry of Transport, NRC: Nigerian Railway Corporation, FAAN: Federal Airport Authority of Nigeria

(3) Engineering Services （ES）City Infrastructure (North, South, Central), FCDA

As for the road infrastructure proposed by the TS of the FCDA, the design and implementation are carried out by the City Infrastructure (North, South, and Central) of Engineering Services Department of the FCDA. Other transport infrastructures except roads shall be managed by the TS.

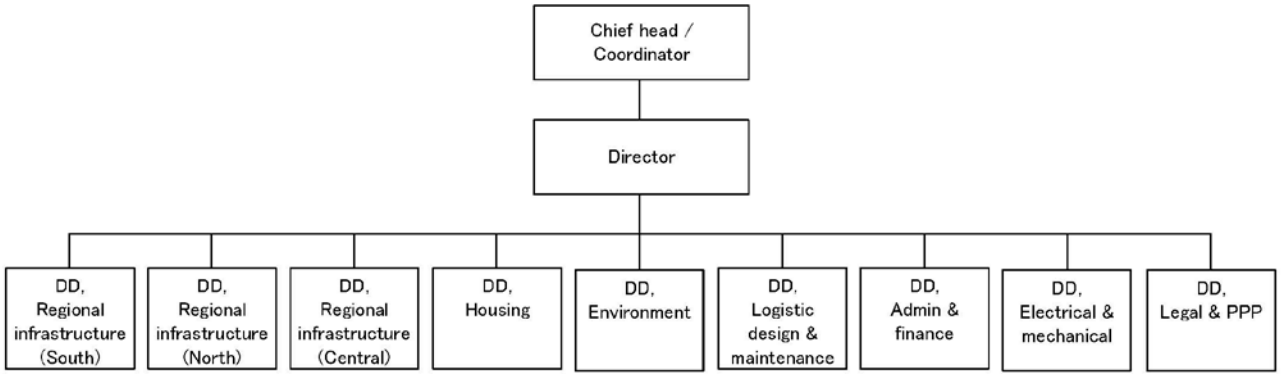


Source: City Infrastructure, Engineering Services Department, FCDA

Figure 6.2.2 Area Coverage by City Infrastructure Unit

(4) Satellite Town Development Department（STDD）, FCDA

Figure 6.2.3 shows the organogram of the STDD. All road infrastructures in the satellite towns except trunk roads connecting the FCC and/or other satellite towns shall be managed by the STDD, because the function the roads inside the satellite towns is not to serve major traffic movements, but to access street side facilities, and the roads shall be developed with other infrastructures.



Source: JICA Study Team based on interview for the STDD

Figure 6.2.3 Organogram of STDD

New construction roads in the towns

Existing roads in the satellite towns

Source: JICA Study Team

Picture 6.2.1 Road Development in the Satellite Towns

6.2.2 Operation and Maintenance

(1) Facility Management, Abuja Metropolitan Management Council（AMMC）, FCTA

It maintains the roads in the FCC and trunk roads connecting the satellite towns. Road maintenance manual has been provided and it includes the routine/periodic maintenance works that should be carried out by road category. The roads located inside satellite towns shall be maintained by the STDD.

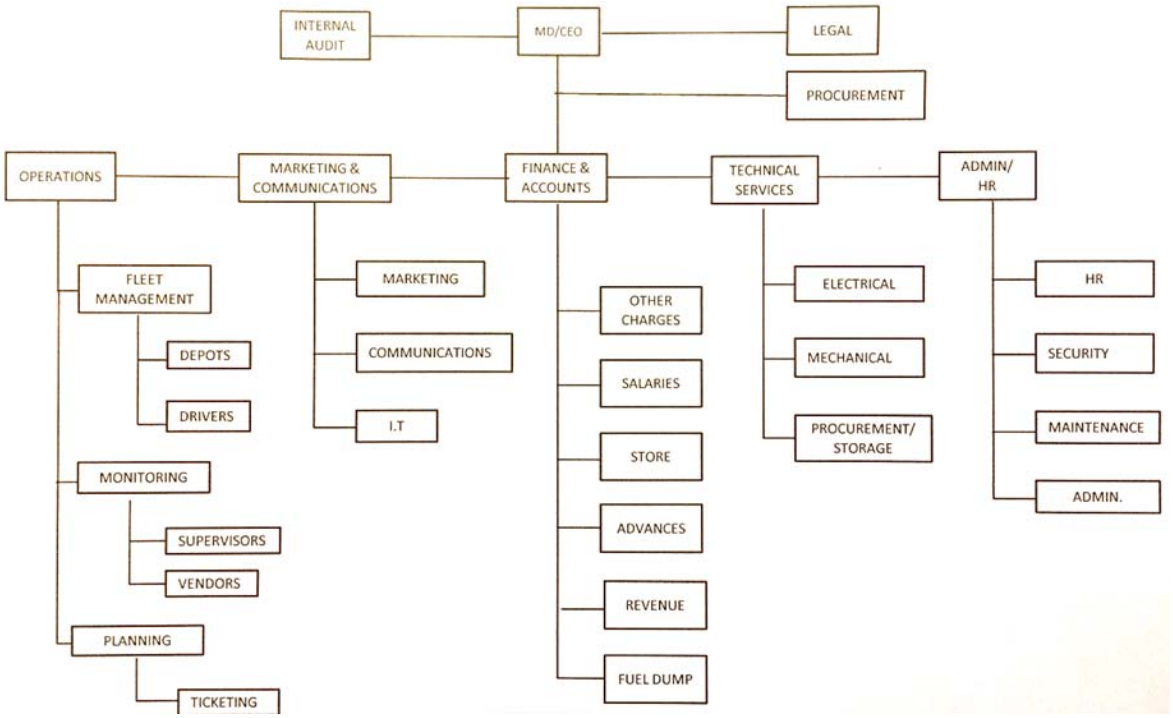
(2) Abuja Urban Mass Transit Company（AUMTCO）

AUMTCO is a state owned company financed by the FCT government under the Abuja Investment Company Ltd. It consists of 5 line departments under the Managing Director (MD): Operations, Marketing and Communications, Finance and Accounts, Technical Services, and Admin departments. The details of the AUMTCO organization, which has 420 employees, of whom 47 are in management positions, are shown in Figure 6.2.4. There are depot facilities in Karu, Gwagwalada and Zuba besides the headquarters, where bus fleets are parked during night time and light maintenance works are conducted.

All the information on the daily passenger volume of AUTMCO is collected and added into its database. Surveyors dispatched at designated checkpoints count the number of daily passengers, and report to the IT.

Source: JICA Study Team

Picture 6.2.2 Bus Fleets Parking in the AUMTCO Headquarters



Source: AUMTCO

Figure 6.2.4 Organogram of AUMTCO

6.3 Other Donors' Activities

(1) African Development Bank (AfDB)

AfDB is planning to implement the "Abuja Integrated Urban Infrastructure Project" in the FCT which covers the satellite towns. A BRT project is the one of the components as the transport sector project, and feasibility study and detailed design of a pilot section is on-going. The works will be completed by June 2019 and an Interim Report I was submitted officially to the FCT in January 2019.

The total study of 950 thousand USD will be covered by a technical grant scheme of AfDB. Actually, for Clean Technology Fund (CTF) has been allocated for the BRT project since the project will contribute to the improvement of the environmental by initiating a shift from private cars to public transport. Specific route of the project is shown in Figure 6.1.10.

A similar integrated infrastructure project has been planned for Aba city located in Abia State. It includes the sub-sectors for upgrading city roads, waste dumping site, and water supply. Besides, a ring road project in Ebonyi State costing around 80 million USD may be co-financed by the AfDB and the Islamic Bank. All 4 lots will be implemented by a parallel loan funding scheme (lot 1 and 2 will be financed by Islamic Bank and lot 3 and 4 by the AfDB).

(2) Chinese Government (Chinese Export and Import Bank)

The lot 1–3 LRT project, which partially started operation last year, had been implemented by DBO (Design, Build, and Operate) concession scheme with the financial support of the Chinese Export and Import Bank. The project for lot 4-6 is at the stage of conceptual design.

Besides, 100 high capacity buses owned by AUMTCO were procured by the Chinese Yutong Traffic Ltd., in 2014.

There is a bus assembly factory in Ibadan area, west of Nigeria.

6.4 Development Condition of Transport Infrastructure

6.4.1 Road Networks and Development Status

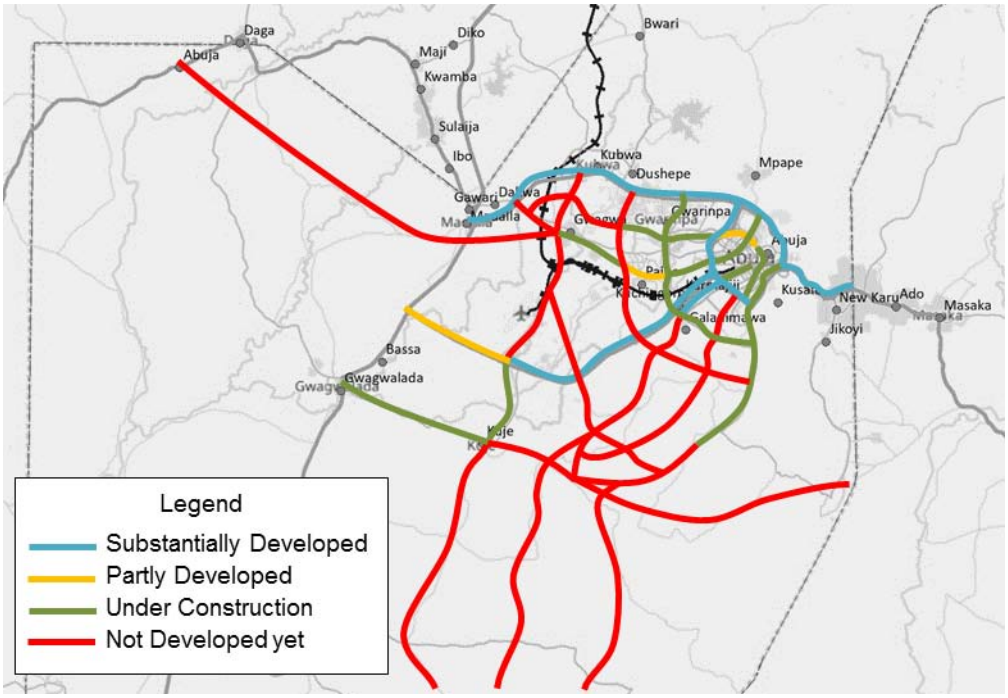
The development status of the trunk road network (expressway and arterial roads) connecting the FCC and the satellite towns is as shown in Table 6.4.1 and Figure 6.4.1. The trunk road network should be developed faster in order to achieve the required urban framework and smooth traffic flow. The trunk road network in the FCC includes the Northern Outer Expressway (NOEX), Southern Outer Expressway (SOEX), Northern Inner Expressway (NIEX9, Southern Inner Expressway (SIEX), and ring road No 1 – 3 (RR1, RR2, RR3), of which only NOEX, a part of SOEX, RR1, and airport road are developed as of January 2019. Therefore, development status of trunk roads in the FCC is low even if the temporary and under-construction sections are counted.

Table 6.4.1 Development Status for Roads Infrastructure

Phase	Planned completion year	Trunk roads	District roads
Phase 1	1990	Approx. 70%	Approx. 90%
Phase 2	1995	Approx. 30%	Approx. 35%
Phase 3	1998	Approx. 15%	Approx. 25%
Phase 4	2006	Approx. 10%	Approx. 5%
Phase 5	-	Approx. 5%	-

Source: JICA Study Team based on interview for Engineering Services, FCDA and their materials

On the other hand, even though development status of district road network (collector roads, minor access roads, and local streets) for phase 1 has reached approx. 90 %, the progress against planned completion year is quite behind the schedule. Some of the missing road sections are causing serious traffic congestion in the FCC nowadays.



Source: JICA Study Team based on Engineering Services, FCDA

Figure 6.4.1 Development Status for Trunk Roads in the FCT

Extension of expressway

Widening of highway

Temporary one-way operation in the CBD

New construction of flyover section in the CBD

Source: JICA Study Team

Picture 6.4.1 Road Development in the FCC and FCT

The surface condition of the existing roads is usually poor in the satellite towns except for the new roads in the planned area. The trunk roads connecting the FCC in satellite towns of ten pass through the centre of the

satellite towns, and the area along the road is used for commercial purpose. Therefore, major bottle necks are found in the centre area of the satellite towns.

Trunk roads in Karshi area

Trunk roads in Nyanya area

Source: JICA Study Team

Picture 6.4.2 Trunk Roads in the Satellite Towns

6.4.2 Bus Networks and Stops (Terminals)

Only high capacity buses with 65 passenger capacity could be operated in the FCC (currently only in the phase 1 area due to development delay), and buses with lower passenger capacity are prohibited to operate in the FCC to avoid traffic chaos similar to that of Lagos.

There are many bus stops (terminals) where people transfer to large buses and/or taxis to access the CBD at the junctions located along the boundary roads, namely RR1, NOEX, and SOEX. Besides formal bus stops like Berger bus stop and Garki Area1bus stop (refer to Table 6.4.2) there are many illegal stops the boundary roads. Disordered parking condition by middle and small size buses, taxis, and kekenapep (tricycle) often cause traffic congestion at the in peak hours.

These illegal bus stops (terminals) could be also found in the FCC (phase 1 area). The parking issues may have a large scale impact on traffic flow in some parts of the CC, particularly, in the CBD area where space is usually limited. There are temporary bus stops designated by the TS in the areas with no formal bus stops. However, there are only few such designated bus stops, the parking space is not sufficient, and there is a mismatch with the vicinity environment.

Forma Bus Stops (Terminals)

Illegal Bus Stops (Terminals)

Designated temporary Parking Space

Passenger waiting for Shared Taxi

Source: JICA Study Tem

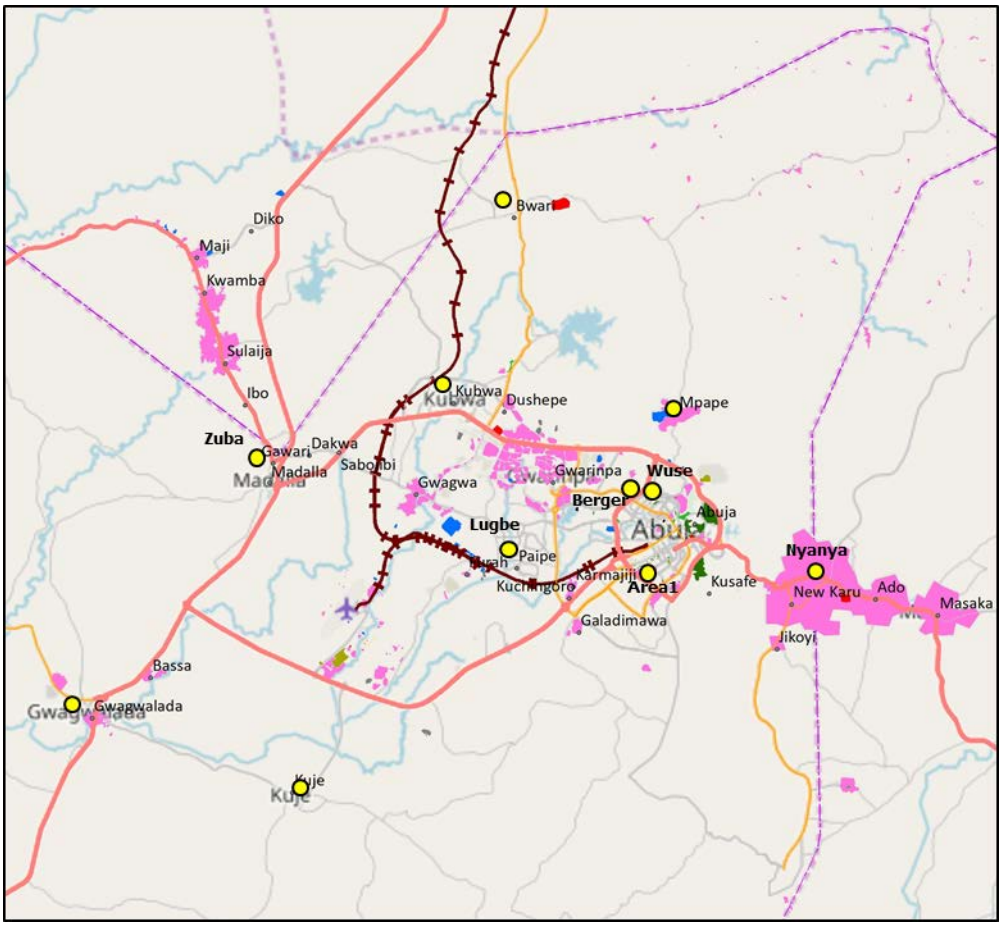
Picture 6.4.3 Bus stops (terminals)

Currently, AUMTCO is the only company providing bus service in the FCC. AUMTCO specifies 25 satellite town routes and 8 inner city routes. However, only 12 satellite towns routes and 1 inner city route are available as of January 2019.

Table 6.4.2 AUMTCO Bus Route

No	Route	Fare	No	Route	Fare	No	Route	Fare
1	Masaka-Wise/Berger	150	12	Zuba-Wuse/Berger	100	23	Jikowi-Area1	100
2	Masaka-Area1	150	13	Suleja-Wuse/Berger	150	24	Karshi-Nyanya	100
3	Addo-Wuse/Berger	150	14	Gwagwa/karimo-Berger	100	25	Mpape-Wuse/Berger	100
4	Addo-Area1	150	15	University shuttle	70	26	Area1 circular	50
5	Mararaba-Wuse/Berger	100	16	Gwagwalada-Wuse/Berger	200	27	Gudu-Gwarimpa	50
6	Mararaba-Area1	100	17	Gwagawalada-Area1	200	28	Area1-Berger route1	50
7	Nyanya-Wuse/Berger1	100	18	Lugbe-Wuse/Berger	100	29	Area1-Berger toute2	50
8	Nyanya-Area1	100	19	Lugbe-Area1	100	30	Area3-Banex plaza	50
9	Kubwa rail bus shuttle	150	20	Kuje-Berger	150	31	Metro rail bus shuttle	100
10	Kubwa-Wuse/Berger	100	21	Idu rail bus shuttle	150	32	AYA-Nicon junction	50
11	Bwari-Wuse/Berger	100	22	Jikowi-Wuse/Berger	100	33	AYA-Banex	50

No. 1–25: Satellite town routes, No. 26–33: Inner city routes, Fare unit: Naira / time
Note: Operated in marking route in above
Source: JICA Study Team based on interview and AUMTCO web page



Source: JICA Study Team

Figure 6.4.2 Locations of Bus Stops in Operation by AUMTCO

According to an interview with AUMTCO, the main reasons preventing the company from providing good and enough services are as follows.

(3) Lack of Bus Fleet (Budget, Maintenance Depot)

The AUMTCO owns 372 buses in total, of which only 200 vehicles are available for operation. The breakdown of the buses by manufacturer is as follows: 101 buses Tata, India; 100 buses by Ashok, India; 100 by Yutong, China; and 71 buses by Brazil (Germany products). The latest buses are those of Yutong procured from in 2014. Actually, the quality of the Tata buses procured in 2012 is poor and served only for 4 years.

The AUMTCO thinks that at least twice of the current bus fleet is necessary to provide good quality bus services, and the AbuTrans Initiative shows that a minimum of 1,000 high capacity buses are required to cope with peak demand. Under such considerations, it is clear that the current number of bus fleet could not accommodate the demand between FCC and satellite towns. Besides, there limited depots needed to maintain the buses in a good condition, and the facilities of the depots are also poor due to budget constraints.

(4) Demand Gaps between Peak and Off-Peak

Feasible passenger demand is observe only during short period of morning/evening peak hours for CBD – satellite town routes. But the demand during off-peak hours is low, and the operation of the number of buses required for peak hours is not efficient. Several private company tried to begin bus service in the FCC in past; however, all attempts have failed so far due to such unfeasible business environment. As a result, no private companies are interested in providing bus service in the FCC, according to interviews with AUMTCO and Road Transport Employers Association.

(5) Insufficient Operation Due to Traffic Congestion

Bus fleet rotation for service is quite low, and operation is not efficient since it takes the buses a long time to travel between the CBD and the satellite towns during the morning/evening peak hours.

Source: JICA Study Team

Picture 6.4.4 Traffic Condition in Rush Hour

(6) Limited Demand for City Bus Service

The investment in the FCC is delayed and low. The central area is dominated by government buildings, and there are only few residents and limited commercial activities in this area. Therefore, the demand for bus service in this area is low. A service by compact buses may be appropriate in such low demand condition, but the service by such unregulated buses is prohibited in the FCC and not available.

6.4.3 Railway Network and Development Status

(1) LRT

The development status of LRT Lot 1 – 6 stipulated in the Public Transportation Concept for Abuja's Metropolitan Area being executed by the FCT varies. The construction of LRT Lot 3 which connects the CBD and airport was completed in July 2018. The project package consisting of LRT Lot 1 - Lot 3 was contracted to a Chinese consortium by DBO (Design, Build, and operate) concession scheme. Lot 1A and Lot 3 of phase 1 were completed by at end of 2018 and Lot 1B and Lot 2 will be commenced soon. Only 3 stations of Lot1A and Lot3 (Abuja Metro St., Idu St., and Airport St.) are currently in operation. Rolling stock depot is located next to Idu station and only 1 unit of 3 train sets operates in these 3 station twice round trips a day (no operation in weekend). Because of such operation conditions, LRT could not meet requirement as an urban transportation system which addresses mass capacity and high speed. It takes around 40 minutes between Abuja Metro St. and Airport St, and the fare of LRT is 1,000 naira per time for adults and 700 naira for children (500 naira per half way for adults and 300 Naira per half way for children), which is approx. 5 – 6 times against the fare of bus services.

LRT is currently not electrified yet, and rolling stock is pulled by diesel locomotive. There is a plan to electrify the LRT in the future, but the schedule is still unclear. According to comments of a TS officer, procuring multiple unit with a hybrid system is being considered for the non-electrification period.

There is a high probability that next coming LRT Lot 4 will be taken by China considering the similarity of the system since they had taken advantage of LRT Lot 1 – Lot 3.

Table 6.4.3 Development Status for Abuja LRT

Lot No.	Length	Status	Design		Construction & Supervision		Operation	Vehicle & Maintenance	Cost	
			Conceptual Design	D/D	Supervision	Construction			Civil	Rolling stocks
Lot 1A	23 km	Under construction	CPCS Transcom Limited	CCECC (DBO scheme) Desing & Construction 48 months			Not yet (CCECC may appointed)	48cars (16 sets) in total for Lot1-3	834 mUSD in total (60% of amount is funded by loan from China EXIM bank)	194mUSD in total (157mUSD by loan 37mUSD by FCT), 85% : 15%
Lot 1B	26 km	Under construction					Not yet (CCECC may appointed)			
Lot 2	50 km	Under construction					Not yet (CCECC may appointed)			
Lot 3	27 km	In operation (temporary)					CCECC (Concession under FCT Minister)	CRRC (L/A w/ China EXIM Bank) currently, 3cars 1 unit only		
Lot 4	90 km	Conceptual Design	Messrs Ladiom Associates	Not yet (DBO may applied)			Not yet (CCECC may appointed)	Not yet (CRRC may appointed)	N/A	N/A
Lot 5	31 km	Conceptual Design		Not yet (DBO may applied)			Not yet (CCECC may appointed)	Not yet (CRRC may appointed)	N/A	N/A
Lot 6	43 km	Conceptual Design		Not yet (DBO may applied)			Not yet (CCECC may appointed)	Not yet (CRRC may appointed)	N/A	N/A

Source: JICA Study Team based on information from relevant web pages an interview for TS

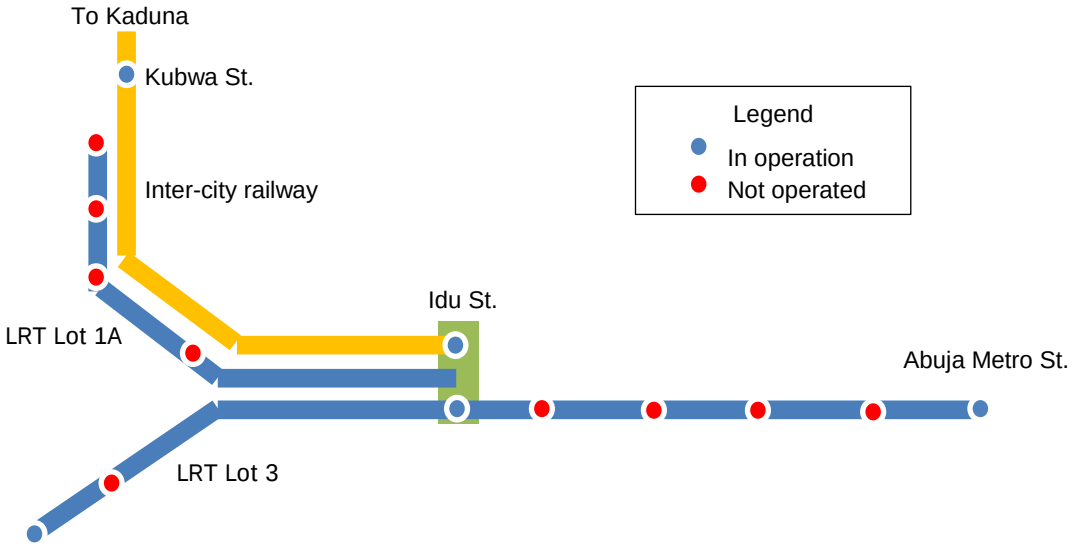


Figure 6.4.3 Current LRT / Railway Network in the FCC

Abuja Metro St.

LRT Rolling Stock

LRT Passengers

Ticket Counter

Source: JICA Study Team

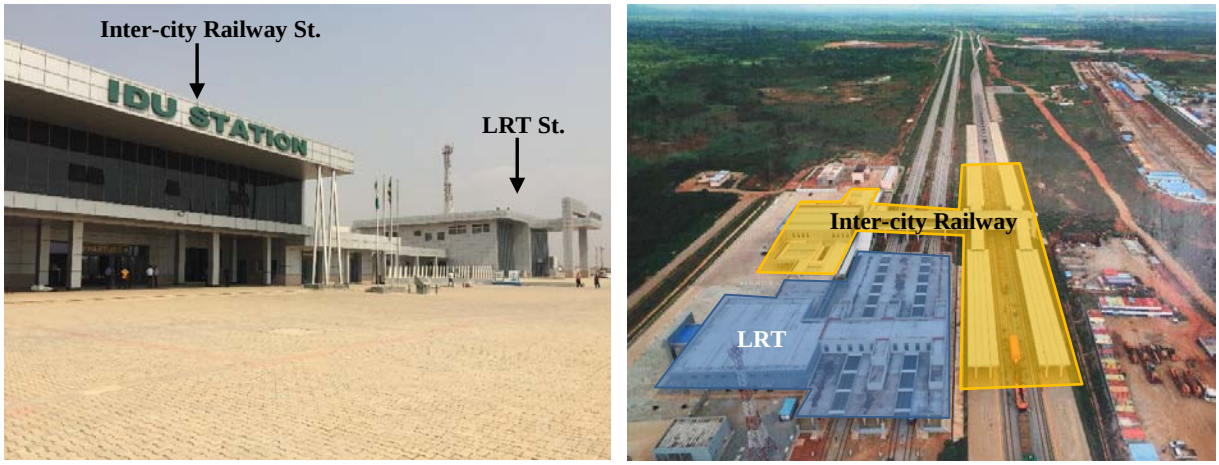
Picture 6.4.5 LRT / Railway Station Facilities and Rolling Stock

(2) Inter-city Railway and Commuter Railway

The inter-city railway from the Idu station of the FCC, to Rigsa station of Kaduna, which has a length of approx. 190 km and placed as a priority project in the Public Transportation Concept for Abuja's Metropolitan Area, has been operating since 2016. The government side contract agency is the Federal Ministry of Transport and operation body is the Nigerian Railway Corporation (NRC). There are two stations, Idu station and Kubwa station, inside the FCC and one station in Kaduna. Trains provide 4 round trips a day (2 round trips in weekend) and takes approx. 2 hours between the FCC and Kaduna. Fare for economy seat is 1300 – 1500 naira and 2500 – 3000 naira for first seat.

Most of the project cost was covered by loan from Chinese Export and Import Bank as well as LRT Lot1 - Lot3 project. The total project cost is approx. 874 million USD, of which 500 million USD is covered by Chinese loan. The project is implemented by DBO concession scheme and awarded to a Chinese consortium. Therefore, China has a strong presence in the railway sectors in the FCT.

Even though Idu station is used for transfer between LRT and inter-city railway, no direct transfer facility is provided inside the station. Transferring passengers have to get out of the station and enter the other station as the two belongs to different operators and have different fare systems. However, it is inconvenient for users to transfer between the two railway infrastructures.



Source: JICA Study Team, CCECC display reference

Picture 6.4.6 Not Integrated Stations for LRT and Inter-city Railway

Other inter-city railway/commuter railway connecting satellite towns are under planning. The railway for Gwagwalada is supposed to link the line to Minna, and railway for Kusaki Yangi is supposed to link the line to Lafia. These planned railways are basically consistent with the 25 years strategic plan for railway development; however, the railway extension plan to southern part is not consistent with the Public Transportation Concept for Abuja's Metropolitan Area.

Source: World Food Program

Figure 6.4.4 National Railway Network and Inter-city / Commuter Rail in the FC

6.4.4 Taxies

All taxi drivers who hold permit could operate in the whole FCT area even though operation by middle or small capacity buses is prohibited in the FCC. A taxi is usually shared by several passengers with the same destination. There are 7 to 8 associations in the FCT issuing license for commercial taxi drivers in the FCT. Painted Commercial Taxi Drivers Association (hereinafter referred as "PCTDA") is the biggest association in the FCT with approx. 8,000 members (interview with PCTDA). It is estimated that there are approximately 30 – 40 thousand licensed taxi drivers in the FCT based on information of the association members. One of the biggest challenges that the commercial taxi business in the FCT is facing is a large number of illegal operators. A TS officer said that approx. 70% of total taxi drivers in the FCT are illegal, making the total number of taxi vehicles operating in the FCT approx. 70 – 90 thousands. The operation of such a large number of commercial taxis operation in the FCT is a major challenge since taxi is privately owned transportation which is convenient but not efficient from occupancy and environment points of view.

Source: JICA Study Team

Picture 6.4.7 Formal Taxi Logo and Rush into Illegal Taxi by Passengers

On the other hand, the number of customer using Uber service, one of the shared-ride services, has been increasing in Nigeria since around 2014, when Uber started its service. Taxify has recently started a shared-ride service similar to that of Uber in Nigeria. A newspaper estimated the number of partner drivers of this service at around 9,000 and users per month about 267,000. Unfortunately, the status of such shared-ride service in Nigeria is still unclear. As a result, there is some opinion conflict between the shared-ride service operators and taxi associations. The associations believes that the shared-ride service operators should pay registration fee to the association to provide a taxi service in the FCT while the shared-ride operators oppose this on the ground that they are not taxi but car hiring service providers. Besides, there are also opinions that it is not fair for the shared-ride operators to pick up and drop off at the airport without making any payment.

6.4.5 Road Associated Facilities

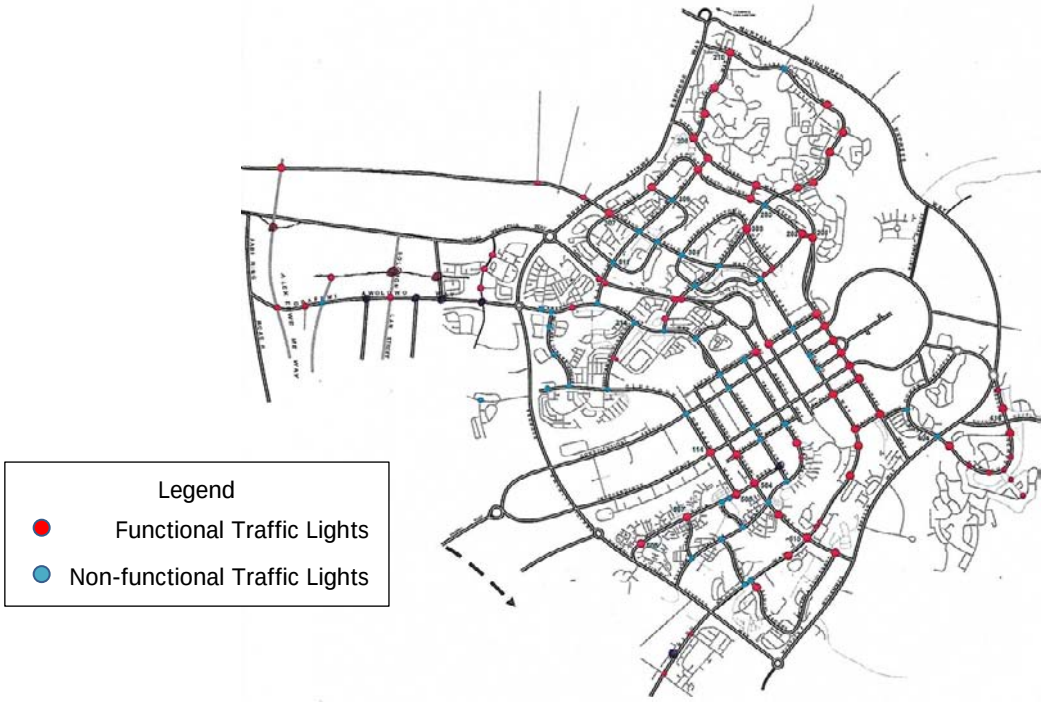
(1) Traffic Lights

There are traffic lights at approx. 170 junctions in the FCT, of which 107 are working. The installation of additional traffic lights at 30 locations will start around May 2019. According to a TS officer, traffic light is necessary for another 300 junctions in the FCT. There are a lot of junctions where traffic light does not work due to poor power supply condition. Recently, lights with solar panel are mainly used in such poor power supply areas.

Traffic lights installed in the FCC are standalone type with fixed cycle length. Therefore, they control the traffic in a pre-set form and do not adjust with traffic. A TS officer confirmed that the introduction of a dynamic signal system, which may prioritize public transport (specifically, in the section proposed for BRT), may be required in the FCC in the near future.

Source: JICA Study Team

Picture 6.4.8 Traffic Lights with Solar Panel



Source: TS Transportation Department

Figure 6.4.5 Location of Traffic Lights by Operation Status

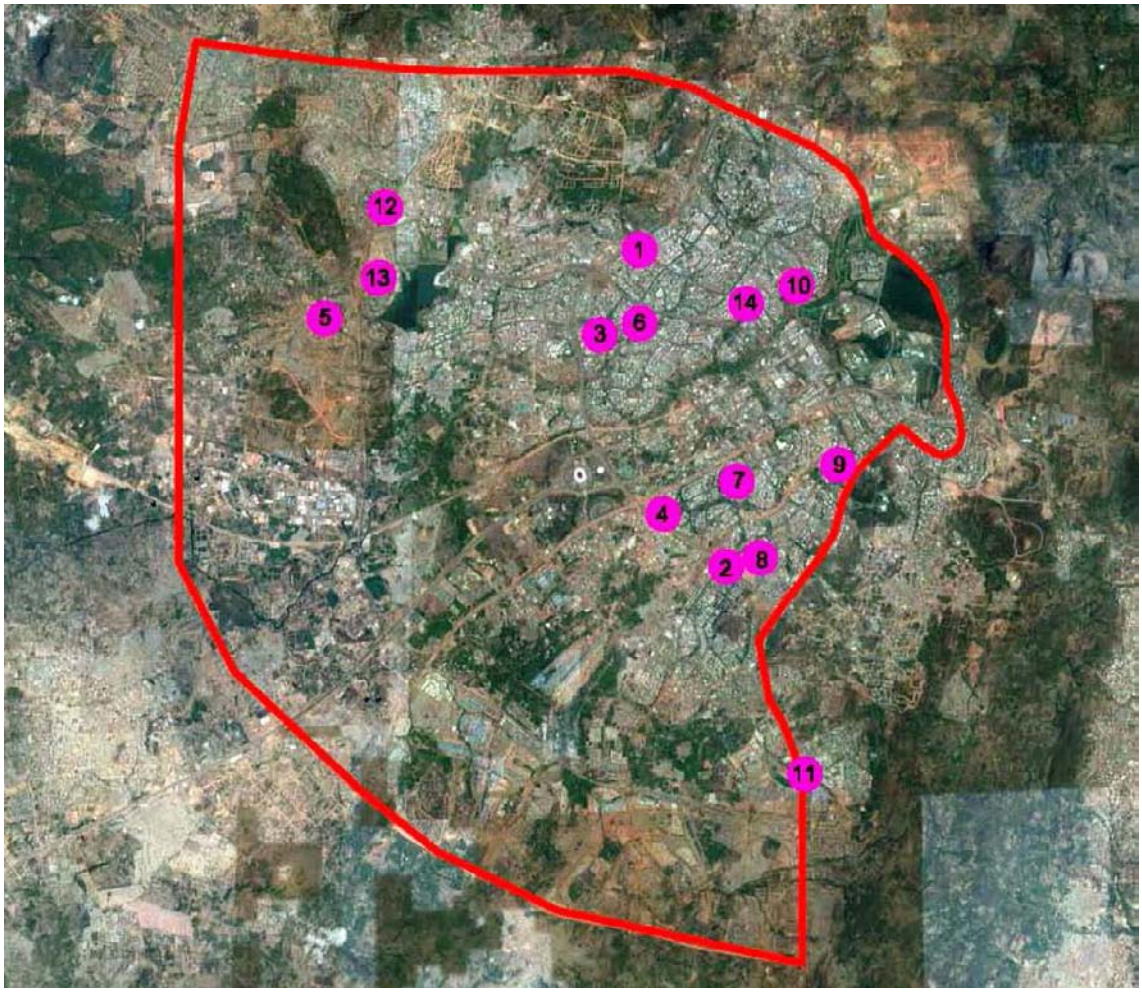
(2) Parking

Traffic flow and pedestrian safety around commercial area and near bus stops (terminals) are adversely affected by illegal parking. Major bottlenecks in the FCC are listed up in following table with their factors. As the table shows, the most of the bottlenecks are caused by parking.

Table 6.4.4 Factors of Major Bottlenecks in the FCC

No.	Bottlenecks	Major factors
1	Banex Junction	Traffic generated/attracted from/to commercial and office, illegal taxi parking
2	Apo Bridge	Parking
3	Sky Memorial	T junction, Traffic generated/attracted from/to commercial and office
4	Area 1Round About	Temporary road development, Parking
5	Kado Fish Market	Parking
6	Wuse Market	Traffic generated/attracted from/to market, Parking
7	Area 10 (CSS-UTC)	Traffic generated/attracted from/to shopping complex, Parking
8	Garki Village	Offset T junction of trunk road
9	Emeka Anyaoku Crescent	Parking
10	Nicon Hilton Junction	U tern traffic
11	Apo Mechanic Village	Temporary road development
12	Gwarimpa 4th Avenue	Parking
13	Life Camp Round About	Parking

Source: JICA Study Team based on interview and site investigations



Source: URP, FCDA

Figure 6.4.6 Location of Major Bottlenecks in the FCC

Despite the above series conditions, parking policy has not been established so far for the FCT. A part of parking demand in the FCC is met by provision of on-street parking spaces; therefore, arterial and collector roads in the FCC typically include a parking lane. The development control manual requires large scale of buildings to provide necessary parking spaces to meet demand, and small scale building to assess the impact of on-street parking. However, there is no clear or standard definition for development scale nor for parking spaces required in the development control manual.

The FCT road transport regulation 2005 defines that the TS could designate temporary parking spaces. A location for park & ride, if necessary, is also decided by the TS.

Park and pay policy was implemented as a new parking policy during 2012 – 2014, but it failed due to strong opposition from the public and insufficient legal framework.

(3) Traffic Demand management

No traffic demand management project has been implemented in the FCT, according to interview with a TS officer. However, since LRT and inter-city railway started service 2018 and the introduction of BRT is expected, traffic demand management policies may be required in the near future to encourage the private car users to shift to public transit. Review study for the Transport M/P is currently on-going, but it does not include traffic demand management, and further consideration on this matter is required.

6.4.6 Airport

Nnamdi Azikiwe International Airport (hereinafter referred to as “Abuja airport”) is located 40 km from the CBD of the capital. Abuja airport is one of the 4 core airports in Nigeria (Lagos, FCT, Kano, and Port Harcourt). The airport is also expected to become an international hub as planned in the master plan for integrated transport infrastructure prepared in 2002. Abuja airport is placed for administration and finance related activities, Lagos and Kano airports for commercial activities in the north and south areas, and Port Harcourt airport for business related to crude oil.

According to latest statistics of the Federal Aviation Authority of Nigeria (hereinafter referred to as “FAAN”), approx. 4.3 million used Abuja airport, through approx. 63 thousand international and domestic flights in 2016. The current annual passenger capacity of the terminal is 7.5 million, and a new terminal building was completed at the end of 2018 (operation is expected to start in 2019increasing the capacity to 15 million per year. Capacity of runway is 140 thousand ATM (Air Traffic Management) per year.

The Master Plan for Integrated Transportation Infrastructure estimated that the Abuja airport traffic would increase by 4% annually. Accordingly, the annual passenger demand would reach approx. 10 million and 160 thousand ATM per year in 2040. The expected passenger volume could be accommodated by new terminal building in 2040, but the runway capacity would be below that requirement in 2040. However, additional runway has been already considered for emergency situations as there is only one runaway. Abuja airport has reserved enough land for future expansion and there is no risk of relocating it in the future.

6.5 Traffic Demand

6.5.1 Person Trips Pattern

Several studies on the mobility pattern in the FCT have been conducted as listed below. This study could obtain the “Feasibility Study and Conceptual Design of Lots 1,2 and 3 of the Abuja Mass Transit System, 2009”, but other studies also have to be reviewed carefully reviewed in the future. According to the EPRS report, the FCC generates approx. 1.28 million trips per day.

The following are traffic studies conducted in the FCT:

- Transit Ridership & Par-Transit Survey 2007
- Abuja Traffic and Ridership Survey 2009
- Feasibility Study and Conceptual Design of Lots 1,2 and 3 of the Abuja Mass Transit System, 2009
- FCT Origin & Destination Survey 2010

- FCT Travel Demand Survey 2013

The above-mentioned report includes passenger demand analysis for LRT Lot1 – 3. The forecast passenger demand in the opening year of 2030 is as shown in Table 6.5.1. Large gaps are found between forecast and actual users, and operation pattern is quite different from the planned one, i.e. only 2 round trips frequency per day for LRT Lot 3. It is expected that demand forecast will be updated based on the actual condition as soon as possible.

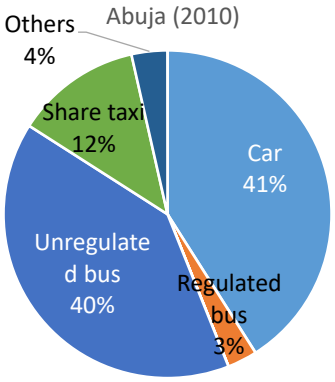
Table 6.5.1 Demand Forecast of Abuja LRT as of 2009

	Demand (pax /day/ direction)		Actual	Remarks
Lot No.	Opening	2030	2019	
Lot 1	163,000	213,000	Not opened	
Lot 2	68,000	130,800	Not opened	
Lot 3	34,000	61,000	Less than 1,000	Site investigation

Source: Feasibility Study and Conceptual Design of Lots 1, 2 and 3 of the Abuja Mass Transit System

6.5.2 Modal Share

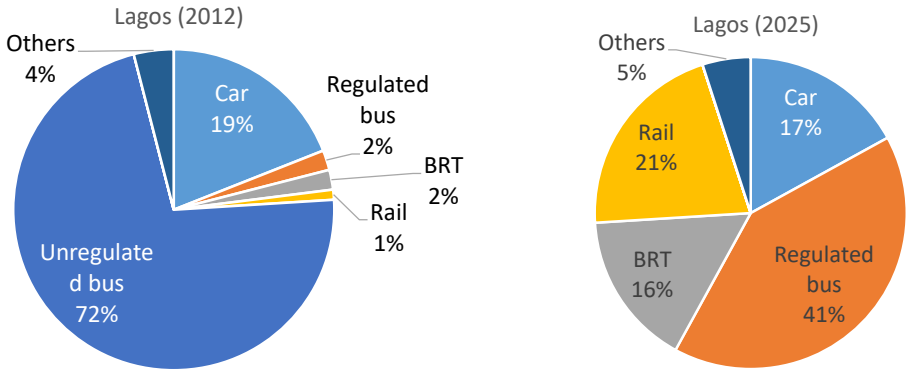
Transport modal share, except for non-motorized modes, in the FCT is shown in Figure 6.5.1 Approx. 40% of total trips are made by private cars. The share of private transportation modes including taxies is over 50% in the FCT. On the other hand, the share of regulated bus including government bus service remains only 3%. It is important to set a future vision to improve the public transport services, included this provided by the government, to increase their share to a reasonable level.



Source: Statistical Year Book 2010

Figure 6.5.1 Current Transport Modal Share in the FCT

The figure below shows the current modal share of transportation and future target in Lagos metropolitan area. Approx. 70% of total trips are currently made by unregulated buses, and the goal is to shift these trips to other public transport modes (railway, BRT, and regulated bus service) by 2025.



Source: LAMATA

Figure 6.5.2 Comparison of Current and Future Modal Shares in Lagos

6.5.3 Methodology of Traffic Demand Analysis

There are several analyses of the traffic demand in the FCT conducted based the person trip survey descried in the previous chapter. For instance, the demand for LRT Lot 1 – 3 was estimated by demand analysis model based on person trips database collected by household survey in the Feasibility Study and Conceptual Design of Lots 1, 2 and 3 of the Abuja Mass Transit System, 2009. These demand analysis works shall be made on simulation model by awarded consultants subcontracted by the TS. Currently simulation is based on EMME/2 software which is produced by INRO located in Canada since CPCS Transcom Ltd., which carried out the several transport oriented studies, including the LRT Lot 1 – 3 and Public Transportation Concept for Abuja's Metropolitan Area Abuja, is located in Canada. According to Kuntech and Associates, TransCAD will be utilized for simulation of the Transport M/P.

For the reference, Table 6.5.2 summarized a comparison of three kind of software, EMME/2, TransCAD, and JICA Strada. All three types of the software were released before 2000s, and they show no significant difference

Table 6.5.2 Comparison of Traffic Demand Analysis Tools

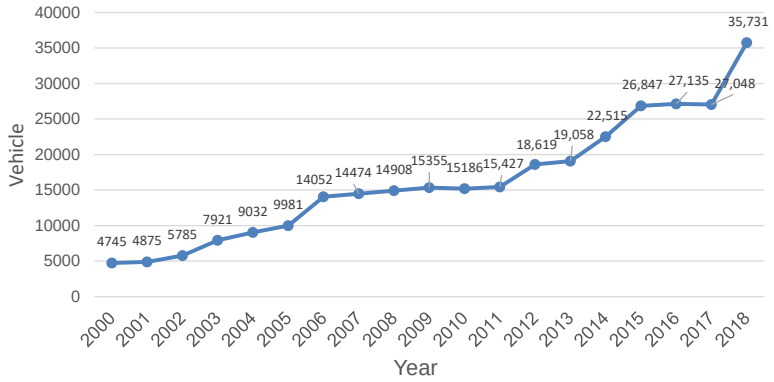
Items			EMME/2	TRANSCAD	JICA-STRADA
Host countries			Canada	USA	Japan
Released			1983	1989	1995
Restriction on simulation		Number of zones	6,000	Unlimited	Unlimited
		Number of links	120,000	Unlimited	Unlimited
		Number of nodes	48,000	Unlimited	Unlimited
		Transit routes	12,000	unlimited	10,000
	Generation/Attraction	Regression / Unit rate	-	○	○
	Distribution	Gravity model	○	○	○
		Fratar method	○	○	○
	Modal choice (non aggregated)	Logit model	○	○	○
		Nested Logit Model	○	○	○
	Assignment methodology	Capacity restriction	○	○	○
		Probability	○	○	○
		Increment	○	○	○
		Equivalent	○	○	○
		Dynamics	Not applicable	○	Not applicable
		Hourly basis	○	○	○
		Transit priority	○	○	○
	Intersection analysis		○	○	○
	Coordination GIS		ArcInfo	ArcView MapInfo	ArcView Mapinfo
	Traffic Demand Management	Roads Pricing	○	○	○
		HOV lanes	○	○	○
		P&R Analysis	○	○	○
		Gas emission	○	○	○

Source: Traffic demand and JICA Strada, IT Urban Institute
Note: JICA STRADA, Ver.3.5

6.6 Roads and Public Transport

6.6.1 Registered Number of Vehicles

The number of registered vehicle, excluding vehicles for commercial purpose, has been growing rapidly in the FCT, and the annual growth rate exceeded 10% after 2000.



Source: Registered Number database, TS

Figure 6.6.1 Registered Number of Vehicle in the FCT

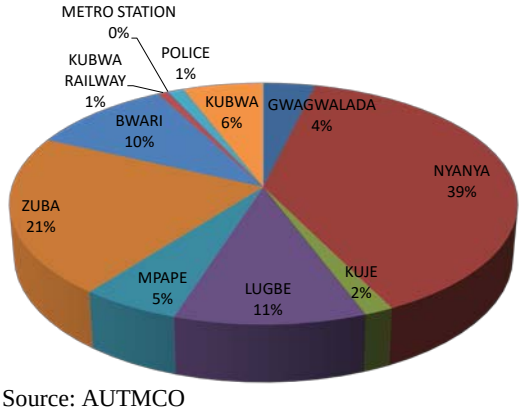
6.6.2 Bus Passengers

Passenger volume served by AUMTCO in November 2018 is summarized in Table 6.6.1. The passenger market share of Nyanya satellite town is approx. 40% of the total, the highest of all. It is followed, respectively, by share of Zuba with 21 %, Lugbe with11 %, and Bwari with 10%. Vehicles are allocated according to the market share, and, for example, 14 buses are allocated daily for Nyanya satellite town route. The bus rotation of certain route is very low, and operation is not efficient; for example, it is less than 3 trips/vehicle per day even in the Nyanya area. The average passenger volume per vehicle is close to the capacity or more, even though a part of database is not reliable, and it seems that passenger demand could not be accommodated by high capacity buses operated by AUMTCO.

Table 6.6.1 Operational Conditions by Routes (November 2018)

S/N	ROUTES	Number of bus (veh/month)	Number of bus (veh/month)	Number of operation (time/month)	Pax volume (pax/month)	Avg. pax/veh (pax/month)	Number of rotation/veh	Market share
1	GWAGWALADA	83	3.8	61.0	6,143	101	0.7	6%
2	NYANYA	301	13.7	840.0	62,979	75	2.8	40%
3	KUJE	34	1.5	42.5	2,631	62	1.3	2%
4	LUGBE	62	2.8	258.0	17,402	67	4.2	6%
5	MPAPE	62	2.8	99.5	8,995	90	Number	6%
6	ZUBA	223	10.1	302.5	34,641	115	1.4	22%
7	BWARI	113	5.1	171.5	16,772	98	1.5	11%
8	KUBWA RAILWAY	25	1.1	26.5	1,094	41	1.1	1%
9	CAMPUS	0	0.0	0.0	0	-	-	0%
10	METRO STATION	30	1.4	39.5	110	3	1.3	0%
11	POLICE	21	1.0	19.5	1,913	98	0.9	1%
12	KUBWA	74	3.4	133.5	9,474	71	1.8	5%
	TOTAL	1028	46.7	1,994.0	162,154	75	1.9	100%

Source: AUTMCO, Monthly Ridership in November 2018



Source: AUTMCO

Figure 6.6.2 Market Share by Routes operated by AUMTCO (November 2018)

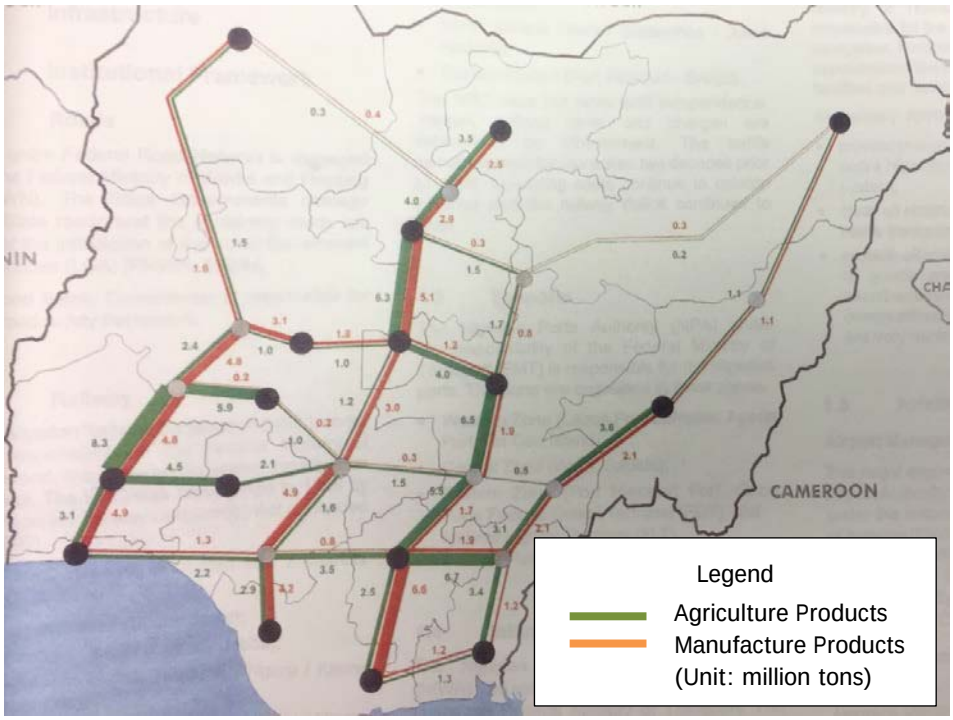
6.6.3 Railway Passengers

Official database for passengers of LRT (Abuja Metro St. – Airport St.) and inter-city railway is not available. However, outline of passenger usage of LRT and inter-city railway could be confirmed by observations made at the Idu station for LRT and Kubwa station for inter-city railway. According to the observation, it is roughly estimated that approx. 1,000 passengers use each LRT and inter-city railway, and approx. 200 – 300 passengers / time at Idu station and approx. 100 passengers / time at Kubwa station.

6.7 Logistics and Road Transport Regulations

Freight volume on major logistics corridors in 2020 is forecast in the Master Plan for Integrated Transport Infrastructure. Freight is categorized into two kinds of products: agriculture products and manufacture products. Logistics corridors are fixed considering layout of major industrial bases, road network, and railway network in Nigeria.

The FCT has high logistics activity potential since it close to a large agricultural area and since the Kano – Kaduna area is designated as an industrial zone in Nigeria. The transport infrastructures to serve the flow of freight around the FCT are the federal expressway A2 and A234 and the railway to be constructed to connect the CBD of FCT and the satellite towns.



Source: Master Plan for Integrated Transportation Infrastructure

Figure 6.7.1 Estimated Volume of Logistics on Major Corridors at 2020

Regulations related road and railway transport in the FCT are listed below. All the rules needed for regulating the road transport business including permission system and fare setting policies in the FCT are stipulated in the road transportation regulations 2005. The following are the road and railway transport regulations and acts:

- FCT Road Transport Regulations 2005
- Federal Highways Act
- Federal Road Safety Commission (Establishment) Act, 2007
- Nigerian Railway Corporation Act

6.8 Evaluation of Existing Transport Master Plan (The Transport M/P)

The demand and supply gaps of the infrastructures connecting the FCC and satellite towns should be evaluated, especially for the major 3 sections (CBD – Nyanya/Karshi, CBD – Kubwa/Zuba, and CBD – Lugbe/Kuje), for which BRT project have been considered.

6.8.1 Traffic Demand

The traffic demand of each of the major 3 sections is estimated by number of total inflow trips into the FCC (refer to 6.5.1) and market share of AUMTCO by satellite towns (refer to Section 6.6.2). According to this estimate, the daily demand for Nyanya/Karshi is 514 thousand trips, 59.1 thousand trips for Kubwa/Zuba, and 180 thousand trips for Lugbe/Kuje. It is assumed that morning/evening peak hour traffic accounts for ratio for total volume of one way is 20% of each direction (80% of total dairy volume of one way traffic concentrates during 6:00 - 10:00 am and 16:00 - 20:00 pm).

Table 6.8.1 Traffic Demand for Major 3 Sections

Major 3 sections	Traffic Demand		
	Daily volume (both way)	Hourly volume (one way)	Peak ratio
Nyanya・Karshi	514,000 trips/day	51,400 trips/hour	20% of one way volume
Kubwa・Zuba	591,000 trips/day	59,100 trips/hour	20% of one way volume
Lugbe・Kuje	180,000 trips/day	18,000 trips/hour	20% of one way volume

Source: JICA Study Team

6.8.2 Capacity of Major 3 Sections

Passenger capacities of roads, BRT, and Railway are estimated as shown in Table 6.8.2. Road capacity is calculated by considering vehicle type composition and average occupancy by vehicle type. Capacities of BRT and railway are calculated by considering passenger capacity of the vehicles and operation frequency.

Table 6.8.2 Development Scenario for Transport infrastructure

Major 3 sections	Current			Future		
	Roads	BRT	Railway	Roads	BRT	Railway
Nyanya・Karshi	3 lanes/direction	-	-	3 lanes/direction	1 line	1 line
Kubwa・Zuba	3 lanes/direction	-	-	3 lanes/direction	1 line	1 line
Lugbe・Kuje	3 lanes/direction	-	-	3 lanes/direction	1 line	1 line

Source: JICA Study Team
Note: capacity of service roads are not considered

Table 6.8.3 Passenger Capacity of Transport Infrastructure

Major 3 sections	Roads (pax/hour/direction)			BRT (pax/hour/direction)	Railway (pax/hour/direction)
	Current	BRT completion	Railway completion		
Nyanya・Karshi	42,336	58,773	77,750	7,800	15,600
Kubwa・Zuba	42,336	58,773	77,750	7,800	15,600
Lugbe・Kuje	42,336	58,773	77,750	7,800	15,600

Source: JICA Study Team
Notes: 2,200 pcu (passenger car unit) for 1 lane /direction, Highway capacity manual
Modal shift from mini bus or tricycle to high capacity bus will be gradually progressed. Therefore, average passenger volume per pcu is 6.4 pax/pcu for current, 8.9 pax/pcu for BRT completion, and 11.8 pax/pcu for railway completion.
Capacity of BRT is 65 pax /vehicle with 30 seconds interval.
Capacity of Rolling stock is 130 pax / car and 1 unit 6 cars with 3 minutes interval.

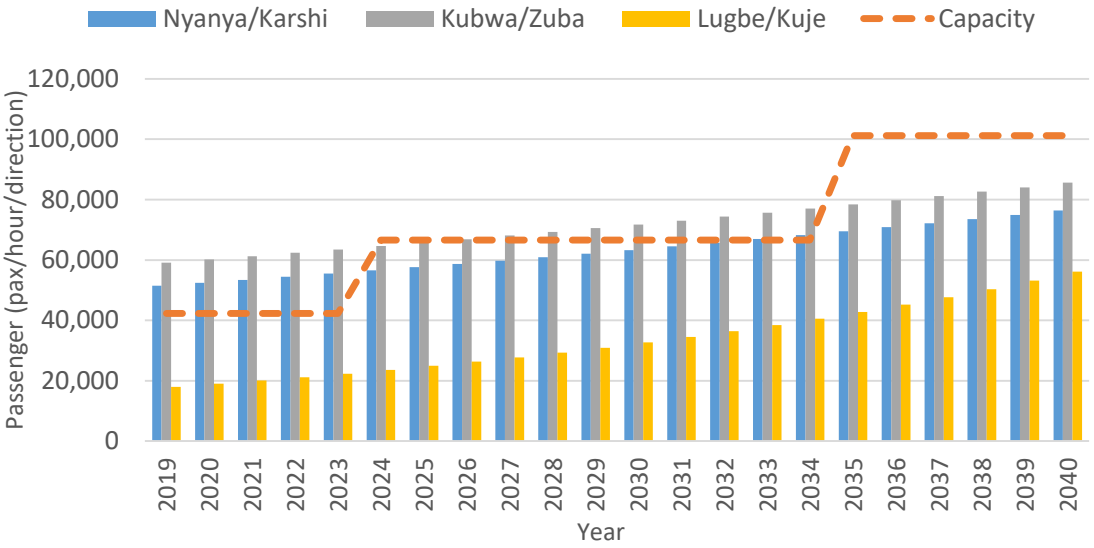
6.8.3 Demand Increase

The traffic demand until 2040 is estimated based on the increasing rate by region specified in the previous chapter (1.0% for Nyanya/Karshi, 1.8 % for Kubwa/Zuba, and 5.6 % for Lugbe/kuje).

6.8.4 Demand and Supply Gaps

The analysis of the demand and supply gaps shows that demand for Kubwa/Zuba section and Nyanya/Karshi section exceeds the current capacity the sections. This results in traffic congestion on trunk roads from CBD to satellite towns in morning and evening peak hours. The demand is expected to reach 86 thousand trips/hour for Kubwa/Zuba and 76 thousand trips/hour for Nyanya/Karshi by 2040. Although the demand for Lugbe/Kuje is smaller than the above two sections, it will be increase to 56 thousand trips by 2040.

The capacity of roads and BRT could not accommodate the demand for Nyanya/Karshi and Kubwa/Zuba sections, and additional new railway line will be required in the future. Especially for northern section, Kubwa/Zuba, the capacity will be below the demand in 2030s.



Source: JICA Study Team

Figure 6.8.1 Demand and Supply Gaps of Major 3 Sections

6.8.5 Possibility of Implementation based on Original Concept

Policy to avoid through traffic in the district, which is defined in the AMP as one of the transport infrastructure concept, highway grid, is still taken over. Person in charge of Transport Secretariat also agreed with this concept, and therefore it is possible to keep the highway grid concept. On the other hand, some part of the area close to the CBD and proposed as ROW for transit way has been developed for other purposes. This may lead to serious land acquisition problems. In case of small progress around CBD, there is not enough impact for the users due to inconvenient connectivity to the CBD. Concept that transit way shall be gradually upgraded according to demand is changed when the concept of mass transit system comes. It is not problem if ultimate development system is same and nothing of finance issue could be found.

6.9 Local Consultants

In the full scaled review and upgrading study of the AMP, a large scale field transportation survey and analysis supported by local partners will be required. Information about local partners who have enough experience in preparation of master plans including field transport surveys financed by international donors is summarized in Table 6.9.1.

Table 6.9.1 Potential Local Consultant for Transport Sector

No	Firm	Location of HQ	Sectors
1	Advanced Engineering Consultants	18, Town Planning Way, Ilupeju, Lagos +234 9093887975	One of the biggest engineering consultant in Nigeria. Conducting field survey and providing data analysis for preparing transport M/P in Lagos. Experience of JICA sub contracting for urban rail project in 2014.
2	FAO Consulting international Ltd.	3 Obasa Rd, Off Oba Akran Av. Ikeja, P.O. Box 800, Marina, Lagos	Experience of partnership with Korean companies for transport planning sectors.
3	Amana Consortium	315B Akin Ogunlewe street Victoria Island, Lagos +234 8029592200	One of the international partner for preparing the AMP in 1971.
4	Team Nigeria Ltd.	No. 34, Port Harcourt Crescent Area 11, Garki, Abuja +234 8033154558	Experience of 25 years strategic plan for railway development. Experience of international door's project in west African countries.
5	Exosphere Nigeria Ltd.	No. 159, Aminu Kano Crescent, Wuse II, Abuja +234 8023391243	Experience of transportation field survey and design / procurement for traffic lights. Conducting field survey of JICA contract.
6	Kuntech & Associates Nigeria Ltd.		Conducting review and upgrading for Urban Transportation Study of the New Capital City Abuja.
7	Messrs Smec Consulting Engineering Ltd.	5th Floor Oakland Centre 48 Aguiyi Ironsi Street Maitama, Abuja +234 8066466843	Experience of various infrastructure planning including transport and urban development sector.

Source: JICA Study Team based on interview for counterpart and relevant authorities

6.10 Problems, Issues and Recommendations

6.10.1 Problems and Issues

(1) Negative Chain of Issues caused by implementation delay for the AMP and Transport M/P

- The development pf the highway grid of truck roads as one of concept for transport infrastructure layout is behind schedule, and transit ways needed to secure the mobility of the people is not also developed so far. As a result of such poor infrastructure progress, traffic bottlenecks are created in the FCC. The FCC population has not been fixed.
- In spite of slow development of the FCC, population of satellite towns has been increasing rapidly. As a result, road capacity between satellite towns and the FCC could not accommodate demand since there is no plan of mass transit for the section. Therefore, traffic congestion on trunk roads connecting the FCC and satellite towns has been observed.
- New mass transit plan between FCC and satellite towns was prepared to increase the transport capacity. Development priority was put on corridors between FCC and satellite towns rather than transit ways in the FCC. However, the FCC and satellite towns shall be evaluated together.
- It is very difficult for bus operators to sustain bus service since there is heavy traffic congestion between FCC and satellite towns and demand in the FCC is low. The public transport service has been falling because of lack of improvement.
- Lack of public transportation modes in the FCC and large number of private car inflows from satellite towns has been leading to traffic congestion around commercial area in the FCC.

(2) Expansion of Issues caused by Political Problems

- A careless/immoral parking in commercial/crowded areas has adversely affects the traffic flow and no concrete parking policy has been established so far.
- Bus operation by medium and small sized buses which may appropriate for the FCC in terms of capacity is prohibited in the FCT. There is no public bus service in the FCC since it is difficult for bus operators to maintain transport business in the FCC due to inefficiency to operate with large bus fleets.
- On the other hand, middle and small sized fleets with low capacity as well as private cars could be operated in the FCC. There are a lot of illegal taxies which need to be strictly controlled.

(3) Non Functional Infrastructure

- LRT opened in July 2018 is not function as urban transportation system because of nothing effective operation without neither high occupancy nor high frequency service. It seems that next LRT lots to be constructed soon are same situation for a moment.
- Traffic lights in the FCT do not have enough functions to control traffic flow since they could not address dynamic control in accordance with real time traffic flow and consecutive signal control.

(4) Lack of Basic Information for Analysis

- As far as reference of chapter 6.5, available traffic database is FCC basis and certain transport oriented. Also few information of transport about satellite towns which affect large impact on transport aspects in the FCT. Therefore, there is insufficient baseline to show current comprehensive transport conditions for the FCT, e.g. person trips pattern, traffic volume database on arterial road, and so on.
- It is still unclear of current transport modal share and future vision

(5) Challenges to Implement next Full-scaled Study

- Demarcation between review study for the Transport M/P under the TS contract and next full-scaled review and upgrading study by JICA will be carefully considered. It seems that JICA side will follow missing scope of works, e.g. current transport conditions around satellite towns, traffic control in the FCC, traffic demand management, scenario analysis based on demand forecast, and so on.

6.10.2 Recommendations

Many transport bottlenecks are caused by complex combination of factors. These bottleneck locations in the FCC are influenced, for instance, by parking policy issue, flood of operating taxi vehicles, car inflow from the satellite towns, etc. In order to stop negative chain as mentioned in chapter 6.10.1 (1), multi actions to deal with such complex of factors are required. It is important that 1) targeting both the FCC and the satellite towns (otherwise, between FCC and satellite towns) together, 2) combination of hard solution such an infrastructure development and soft components such as traffic control, policy issues, and regulations, 3) package to promote modal shift to public transport usage, shall be considered. As a first step to realize, it is necessary to organize integrated transport master plan covering matters on spatial, i.e. FCC and satellite towns, and every kind of transport solutions.

Chapter 7 Water Supply and Sewage

7.1 Water Supply

7.1.1 Overall Plans, Policies and Relevant Projects

7.1.1.1 Overall Plans

The AMP was formulated in 1979 as an overall plan focusing on FCC at national level, and the Abuja Water Master Plan was formulated in 1980 based on the AMP. Afterward, the Abuja Water Master Plan which is the latest one only focusing on FCC was revised in 2008. Figure 7.1.2 shows the main contents of the Abuja Water Master Plan.

7.1.1.2 Relevant Policies

The fowling are four relevant policies, which may be mainly categorized into policies on water source and those on water supply service.

(1) National Water Supply and Sanitation Policy, January 2000

The Federal Ministry of Water Resources established the National Water Supply and Sanitation Policy targeting the year 2011 in January 2000. The policy stated the following as its 2011 targets:

- Service Coverage Ratio: 100% by 2011
- Daily Water Consumption Rate: 120 litter per capita per day for urban area with at least 20,000 persons
- Daily Water Consumption Rate: 60 litter per capita per day for medium scale urban with 5,000 to 20,000 persons
- Daily Water Consumption Rate: 30 litter per capita per day for local area with less than 5,000 persons

(2) Water Resources Policy 2004

The policies that Federal Ministry of Water Resources established in July 2004 for water resource management based on Integrated Water Resource Management (IWRM)[44] are indicated in the Water Resource Policy 2004.

(3) Nigeria Vision 2020

A task force including the National Council, National Steering Committee established the Nigeria Vision 2020 in October 2009. Nigeria Vision 2020 focuses on giving the authority of the water utilities such as FCTWB and extending market & water supply service, upgrading of sustainable water supply service and development of sanitation facilities considering Community Partnership (CP), Private Sector Partnership (PSP), and Private Public Partnership (PPP).

(4) Draft National Water Policy 2016

The Federal Ministry of Water Resources established the Draft National Water Policy focusing on the across Nigeria in February 2016. As the post policy of 'Water Resource Policy 2004', the Draft National Water Policy 2016 focuses on policies for improvement of water quality, protection of the water resources, and efficient management promotion for water use at national level.

[44] This is one of management policies for focusing on the water source management but not on development.

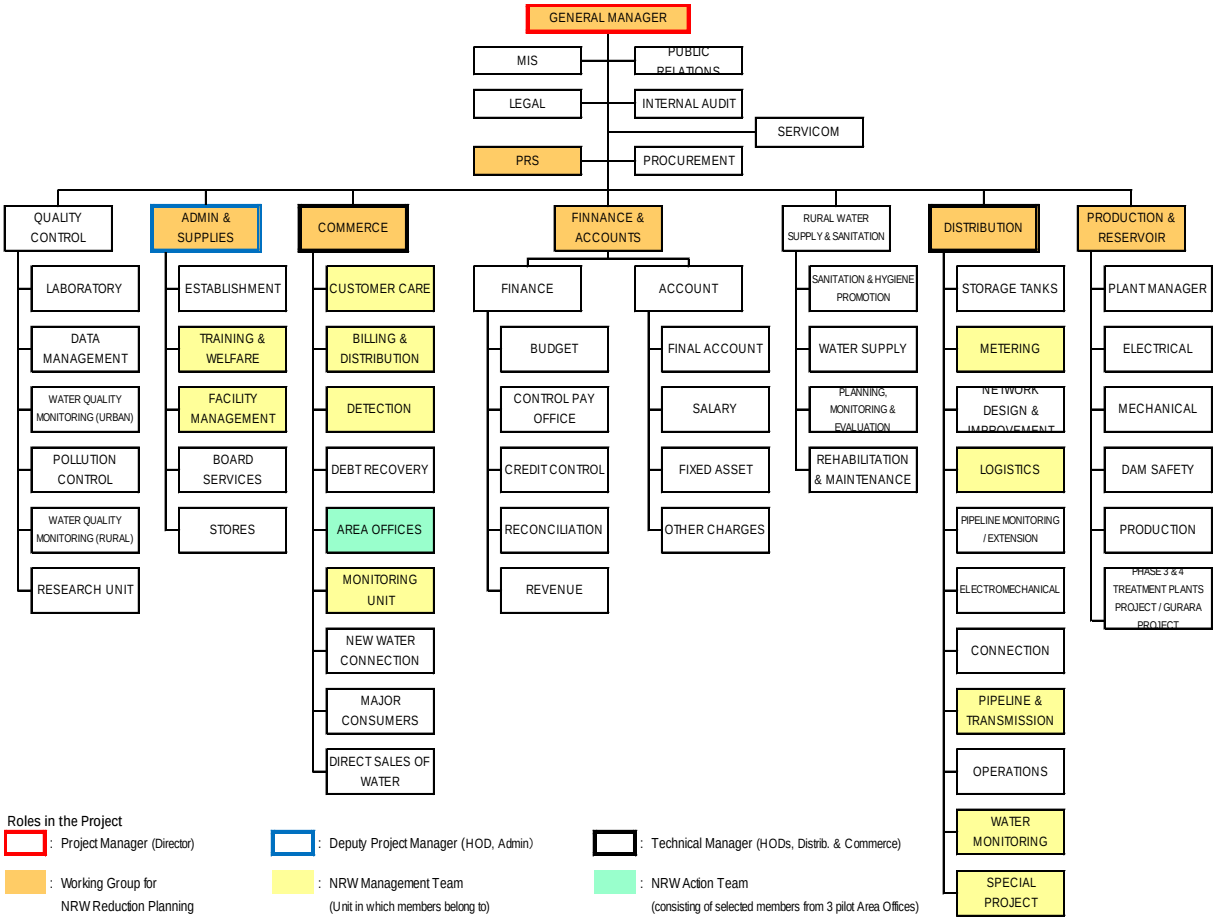
7.1.1.3 Relevant Projects

As project concerned with water supply sector, the project has neither been specified nor materialized yet. However, AFD has been assessing the prospect of assisting Federal Capital Territory Water Board (hereinafter, refer to "FCTWB") in procurement of equipment such as fitting required for the developing small scale standalone water supply system in the satellite towns and leak detectors required for leak detection in FCC, with a total fund of may be about €330,000. As of February 2019 during this study, AFD and FCTWB did not sign the project concept note.

7.1.2 Relevant Organizations and Mandate

The Department of Engineering & Service FCDA is responsible for planning, design and supervision of the water supply sector and has a design guideline. After taking over the water supply facilities from FCDA, FCTWB is consistently in charge of operation & maintenance of the water supply facilities. Figure 7.1.1 shows organogram of FCTWB.

Meanwhile, STDD under FCDA is responsible for planning, implementation, etc. of the infrastructure development in satellite towns, but it is likely that their tasks depend on sector. The Engineering & Service of FCDA and FCTWB are, respectively, in charge of development, and operation & maintenance of at least the water supply. The water supply service to Kubwa and Bwari that JICA Study Team observed is one of the typical cases.

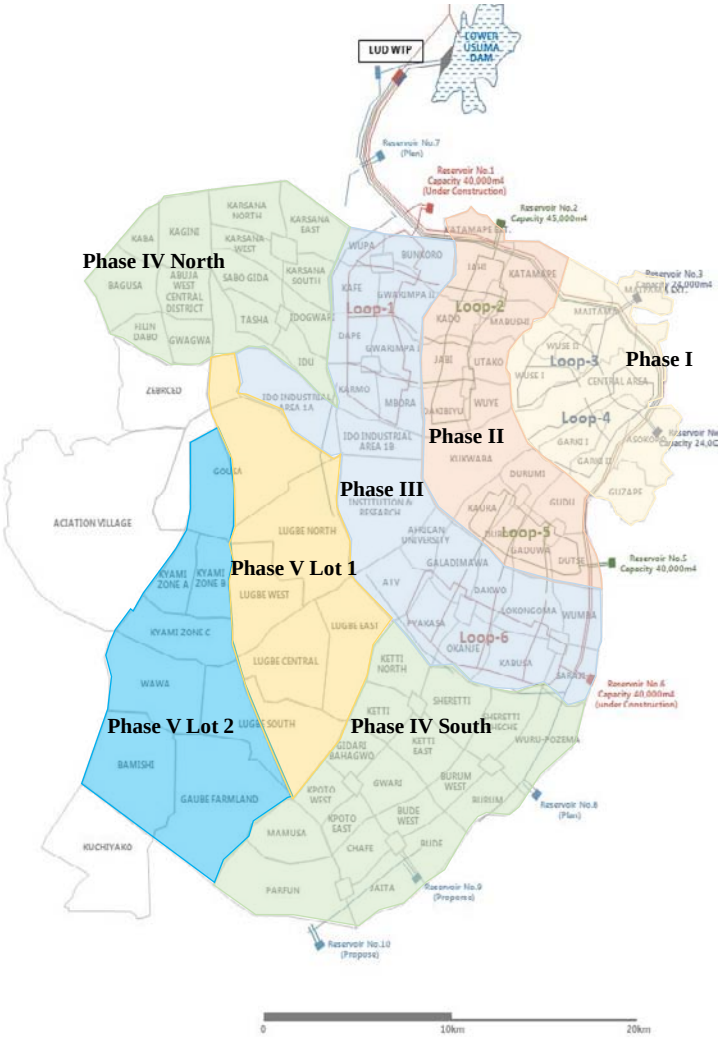


Source: The Federal Capital Territory Reduction of Non-Revenue Water Project in Federal Republic of Nigeria Project Final Report

Figure 7.1.1 Organogram of FCTWB

7.1.3 Relevant Infrastructure

FCDA has been developing treatment plants and transmission & distribution pipelines in FCC based on the Abuja Water Master Plan. The pipeline development plans area prepared by the development area (FCC Phase I to V) as shown in Figure 7.1.2. This is defined as the Water Master Plan that the Engineering Services Department, FCDA is responsible for development. The development of distribution networks is composed of Loop 1 to Loop 10. At the beginning of 2018, the pipelines was developed only in FCC Phase I to III, and the development of distribution pipelines in FCC Phase I was almost completed. Table 7.1.1 shows progress of the implementation by FCC phase.



Source: FCDA and partially processed by JICA Study Team based on the existing drawings

Figure 7.1.2 FCC Development Phase and Development Plan of Pipelines

Table 7.1.1 Progress of Pipe Laying by FCC Phase

Development Phase	Transmission Facilities	Distribution Network No.	Distribution Facilities
1.	Completed	Loop 3&4	Almost completed
2.	Completed	Loop 2&5	Design work completed and about 50% of networks completed
3.	Signed by China for loan*	Loop 1&6	Design completed and to be approved by National Assembly
4.	Award for design work was already released	Loop 7	To be developed by District
	Award for design work was already	Loop 8&9	To be developed by Land Swap

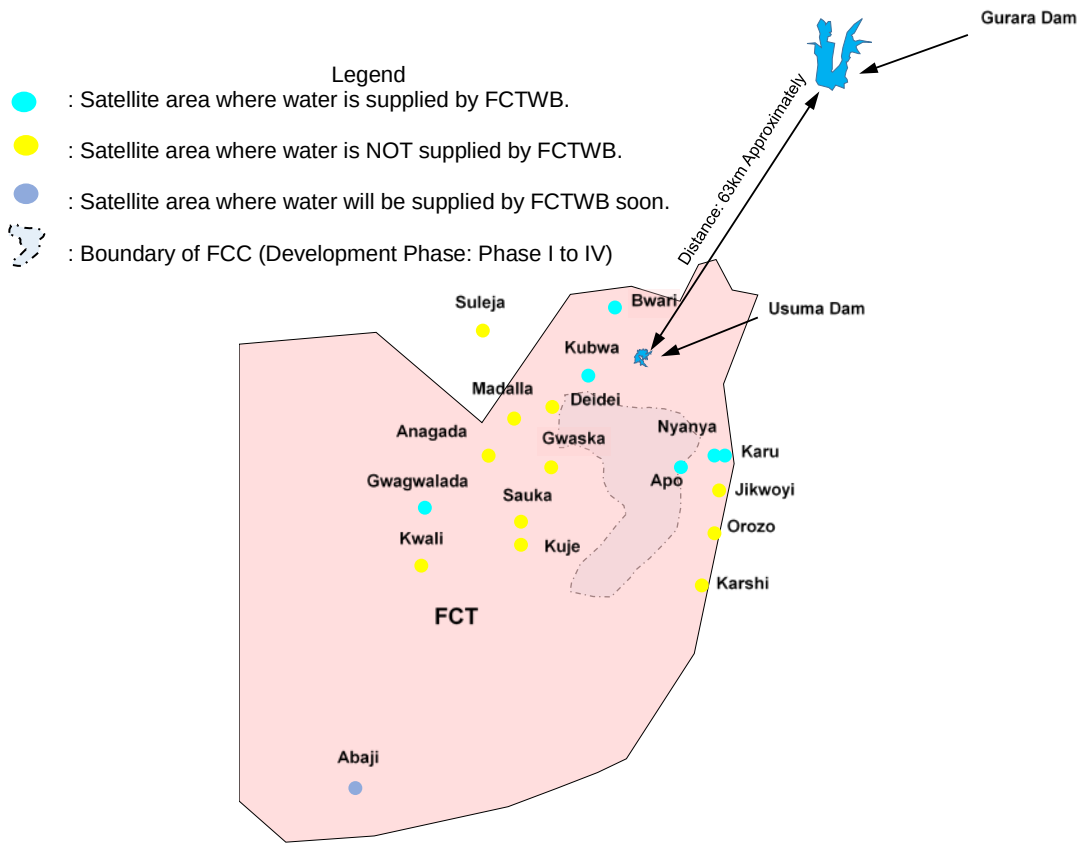
Development Phase	Transmission Facilities	Distribution Network No.	Distribution Facilities
	released Finding source of fund		Award for design work was not released
	Award for design work was already released Finding source of fund	Loop 10	Award for design was not released
5.	Not materialized	-	Not materialized

Source: Documents obtained from FCDA and the result of interview survey with FCDA
*Grace period for payment since commencement of the project and payment period is seven and 21 years respectively.
Annual loan interest is 2.5% which is acceptable percentage for local government to implement loan project easily.
Total loan amounts for developing Loop 1, 2, 5 and Loop 6 is USD 470 million.

The extension of Usuma Treatment Plant (FCC Phase 5 and Phase 6) has not proceeded to design stage due to regular lack of fund. However, since transmission pipelines from the treatment plant (FCC Phase 3 and Phase 4) have not been connected to the service reservoirs and distribution networks, purified water has been supplied to the service reservoirs through the provisional pipelines.

On the other hand, satellite towns such as Bwari, Kubwa, Gwako and Airport was not targeted by the AMP, but FCTWB has provided water supply service (see Figure 7.1.3).

The above information is based on the Abuja Water Master Plan, and interviews with FCDA, STDD and FCTWB.



Source: Interview with FCTWB and prepared by JICA Study Team

Figure 7.1.3 Distribution of Water Supply Service to Satellite Towns

7.1.4 Relevant Laws and Regulations

FCDA applies the 'Guidelines for Engineering Consultancy Services, Final Engineering Design of Infrastructure for the Federal Capital Territory Abuja, Nigeria' for planning standard and design criteria

like daily-per-capita water consumption and load factor. This has been used as the guideline for technical consulting service.

7.1.5 Challenges

7.1.5.1 Challenges on Project Implementation

Among the FCC projects planned in the five phases (FCC Phase I to V) shown in Figure 7.1.2, only the pipeline laying works of FCC Phase I to III was in progress as of the beginning of 2018, and only the pipelines of FCC Phase I were close to completion. In order to improve efficiency of the water supply service, the development of distribution networks is urgently required.

In addition, the Usuma Treatment Plant, which has a design capacity of 780,000m^3/day and covers service areas of FCC and some other satellite towns, has been operating. However, the actual water production of the plant is only a half (about 370,000m^3/day) of its design capacity. This is because the development of transmission pipelines has been delayed due to late release of the budget. In order to raise effect of the Usuma Treatment Plant, the development of the transmission pipelines is necessary.

7.1.5.2 Challenges on Organizational Aspect

The Engineering Service Department of FCDA needs technical assistance to review the AMP as well as formulate a new master plan. The assistance is also important to enable the FCDA to undertake those tasks on its own. However, FCDA and FCTWB should be ready to work with Japanese experts on the review of the AMP as a pre-condition for technical assistance.

FCDA and FCTWB should assign two staff members each for the upgrading of the AMP, but according to discussions with the entities and answers to the questionnaire, it is anticipated that they would need further assistance to build their organizational capacity. Accordingly, another separate technical cooperation should be conducted adequately.

7.1.5.3 Challenges on Status of Urban Development

The current basic information on water supply service, which has being operated by FCTWB, is shown in Table 7.1.2.

Table 7.1.2 Basic Information on Water Supply Service of FCTWB

Items	Basic Information	Remarks
Population	About 3,100,000	Population as at 2019 (Estimated by JICA Study Team)
Service Population	About 225,000	Population as at 2017 based on FCTWB's information
Service Coverage	About 7%	Service Population / Population
Monthly Water Tariff	About Naira90/m^3	Water tariff system is categorized mainly into three; domestic, institutes, commerce, etc. Naira 90/m^3 was estimated in weighted average. Source: "The Federal Capital Territory Reduction of Non-Revenue Water Project in Federal Republic of Nigeria Project Final Report"
Ratio of Water Tariff Collection	About 31.3%	Source: "The Federal Capital Territory Reduction of Non-Revenue Water Project in Federal Republic of Nigeria Project Final Report"

Water is being supplied to the satellite towns, mainly Bwari, Kubwa and Gwagwalada, apart from FCC. However, water is not being supplied to other satellite towns due to delay in pipeline construction. Dwellers in the satellite towns rely on individual shallow wells and or water vendors. In future, judging from groundwater potential in FCT, it is important to examine independent water sources besides the current water sources of Gurara and Usuma Dams f in terms of development speed and cost effectiveness.

According to the 'National Water Supply and Sanitation Policy 2000', the daily per-capita water consumption of an urban area with a population of 20,000 is 120 litre/capita/day. FCDA, however, applies 230 litre/capita/day for water demand projection based on 'Guidelines for Engineering Consultancy Services, Final Engineering Design of Infrastructure'. Therefore, as shown in Table 7.1.3 the JICA Study Team provisionally estimated water demand for the year 2019 and 2025 to 2040, applying 230 litre/capita/day and about 15% of domestic water consumption for non-domestic water consumption, and NRW ratio by year. The NRW accounts for half of the distributed water, so the water demand is a double estimate of total water consumption (i.e., about 1.5 million m^3/day).

Table 7.1.3 Projection of FCT's Water Demand

Year	1) Future Population (Estimated)	2) Daily-per-capita Water Consumption (L/capita/day)	3) Water Consumption of Non-domestic (x 1000L/day) = 1) x 2) x 15%	4) Total Water Consumption (m^3/day) = [1) x 2) + 3) x 1000] /1000	5) NRW (m^3/day) = 6) - 4)	6) Water Demand (m^3/day) = 4) / (1-NRW %)
2019	3.1 million	230	106,950	819,950	698,476	1,518,426
2025	4.2 million	230	144,900	1,110,900	598,177	1,709,077
2030	5.1 million	230	175,950	1,348,950	726,358	2,075,308
2035	6.1 million	230	210,450	1,613,450	868,781	2,482,231
2040	7.2 million	230	248,400	1,904,400	1,025,446	2,929,846

Source: Data estimated by JICA Study Team

Note : NRW ratio as of 2019 is based on the Five Year Mid-term Strategic Plan (2019-2023) which was prepared by FCTWB in cooperation with JICA. JICA Study Team applied NRW ratio of 46% and 35% (as same as % for the year 2023) for the year 2019 and 2025-2040 respectively for calculating NRW.

Table 7.1.4 shows the balance between supply of water and water demand projected until 2040. The water demand in 2040 in FCT is estimated to be 2.93 million m^3/day, with run-off capacity of the two dams of 3.93 million m^3/day. The total excess capacity of water intake at the two dams is estimated to be about 1.00 million m^3/day. According to the water resource master plan formulated in 2014, since groundwater of about 0.60 million m^3/day (considering the climate change) out of 2.90 million m^3/day is available for domestic and non-domestic uses, the excess capacity of water intake at the two dams is estimated to be about 1.60 million m^3/day.

Table 7.1.4 Water Balance between Supply and Demand

Year	Available Capacity of Water Intake at Usuma Dam (m^3/day) a)	Available Capacity of Water Intake at Gurara Dam* (m^3/day) b)	Total Available Capacity of Water Intake at the Two Dams (m^3/day) c) = a) + b)	Water Demand※ (m^3/day) d)	Surplus Capacity of Dam (m^3/day) e) = c) - d)
2019	820,000	3,110,000	3,930,000	1,518,000	2,412,000
2025	820,000	3,110,000	3,930,000	1,709,000	2,221,000
2030	820,000	3,110,000	3,930,000	2,075,000	1,855,000
2035	820,000	3,110,000	3,930,000	2,482,000	1,448,000
2040	820,000	3,110,000	3,930,000	**2,930,000**	**1,000,000**

Source: Data estimated by JICA Study Team

Note: Roundup or round-down for less than 1000m^3/day

*Available water only for water supply of FCT but not irrigation and hydro-power.

Actual water production is about 0.37 million m^3/day out of design capacity of 0.78 million m^3/day in the Usuma Treatment Plant, because transmission pipelines have been developed partially. Since total available capacity of water intake at the dams is enough, extension of treatment plants and development

of transmission & distribution pipelines are one of the challenges being faced to meet future water demand and raise operational ratio of the existing treatment plant.

7.1.5.4 Points to be considered towards Future Plan

(1) Technical Aspects

Currently, FCTWB is mainly supplying water to FCC from Usuma Treatment Plant which purifies raw water of Usuma Dam. FCTWB has also been providing water to the satellite towns such as Bwari, Kubwa, which are located in nearby the plant (i.e., have geographical advantage). In the future, in order to extend the water supply service areas, verification of cost effectiveness will be one of challenges in terms of water resource potential, development cost of water supply facilities, operation & maintenance cost, and water tariff system.

The above information is based on the Abuja Water Master Plan, site reconnaissance, and interviews with FCDA and FCTWB.

(2) Organizational Aspect

FCDA and FCTWB have been responsible for water supply service of some of the satellite towns in FCT. Nigeria President officially signed a bill of autonomy of FCTWB in December 2017. Afterward, organization structure has not been changed yet. However, in the future, in order to extend water supply service in FCT, the capacity of FCTWB (which is responsible for operation & maintenance of water supply service) should be strengthened in terms of staff' assignment and augmentation.

The above information is based on interviews with FCTWB.

In addition, FCDA is responsible for comprehensive development in FCT. However, as long as STDD is one of the stakeholders responsible for the satellite towns development, there are some task demarcation challenges which must be clarified between FCDA and STDD.

7.2 Sewage

7.2.1 Overall Plans, Policies and Relevant Projects

7.2.1.1 Overall Plans

The AMP was formulated in 1979 as an overall plan focusing on FCC at national level. Based on the AMP, the Planning Study & Preliminary Engineering Design of Sanitary Sewer System for the new Federal Capital City titled the Abuja Sewage System Master Plan was formulated in 1980. The master plan has not been revised since then, and Figure 7.2.2 shows the main contents of the plan.

7.2.1.2 Relevant Policies

The following two policies already discussed in the water supply sector also outline the sewage sector policy.

(1) National Water Supply and Sanitation Policy, January 2000

The Federal Ministry of Water Resources established the National Water Supply and Sanitation Policy targeting the year 2011 in January 2000. The policy targeted 100% sewered population and population with sanitation facilities in the whole Nigeria by the year 2011, and ratio of the population should be sustained by 100%.

(2) Nigeria Vision 2020, Oct 2009

Nigeria Vision 2020 focuses on giving the authority of the water and sewage utilities such as FCTWB, AEPB and extending market & water supply service, upgrading of sustainable water supply service and development of sanitation facilities considering Community Partnership (CP), Private Sector Partnership (PSP), and Private Public Partnership (PPP).

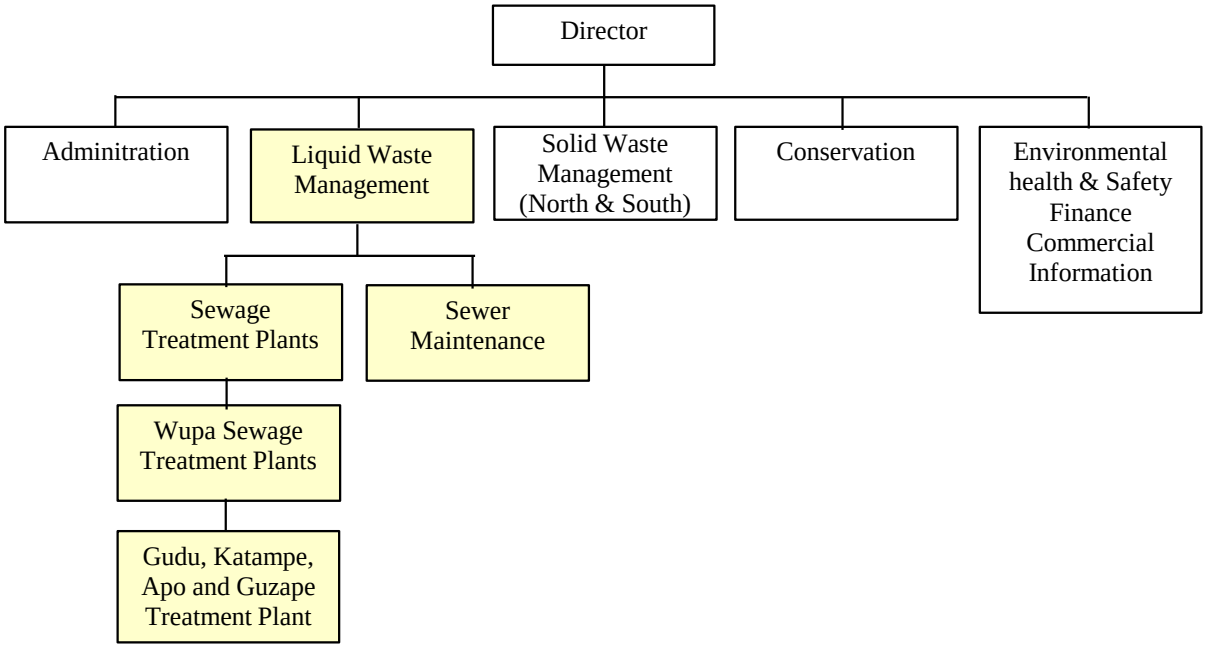
7.2.1.3 Relevant Projects

No project concerned with sewage system has been specified or materialized yet. However, AFD has examined the prospect assisting AEPB in procurement of equipment such as vacuum truck for sewer pipe cleaning, with a total fund of may be about €330,000. During this study, AFD and AEPB did not sign the project concept note.

7.2.2 Relevant Organizations and Mandate

The Engineering & Service of FCDA is responsible for planning, design and supervision of the sewage sector and has a design guideline. After taking over sewage facilities from FCDA, the Abuja Environmental Protection Board (hereinafter refer to “AEPB”) is consistently in charge of operation & maintenance of the sewage facilities. In addition, AEPB approves the installation of septic tanks in the non-sewered areas of FCC and technically directs their users in installation of the septic tanks. Figure 7.2.1 shows organogram of AEPB.

Meanwhile, there is no sewage system in the satellite towns in FCT at all, but individual septic tanks. As stated above, AEPB technically directs their users in installation of septic tanks in the non-sewered areas of FCC and STDD has customer service corners for inquiry on installation of the septic tanks in the satellite towns.



Note: Sewage section highlighted in yellow
Source: AEPB

Figure 7.2.1 Organogram of AEPB

7.2.3 Relevant Infrastructure

The Sewage System Master Plan was formulated based on AMP (1979) in 1980 as shown in Figure 7.2.2.Sewer development consists of Schedule I to X in development lots in the master plan. Sewer development targets 25 years after formulation of AMP, and the sewer pipes are being developed gradually by FCC phases, starting from FCC Phase 1. However, sewer pipes have severely been delayed due to the late release of budget and challenges on securing donors. Table 7.2.1 shows the progress of sewer pipe development by development Schedule. In the non-sewered areas of FCC, FCDA relies on housing developers to install septic tanks provisionally until sewer pipes are laid.

Table 7.2.1 Progress of Sewer Pipe Laying

Schedule	Progress	Points to be considered
Schedule I	Sewer lines completed	In order to replace the sewer lines in Schedule I to IV and Schedule VI, FCDA has been preparing the request letter and cost quotes for subsidy from Ecological Fund office which belongs to Presidential office
Schedule II	Sewer lines completed	Ditto
Schedule III	Sewer lines completed	Ditto
Schedule IV	Sewer lines completed	Ditto
Schedule V	Design completed	
Schedule VI	Sewer lines completed	In order to replace the sewer lines in Schedule I to IV and Schedule VI, FCDA has been preparing the request letter and cost quotes for subsidy from Ecological Fund office which belongs to Presidential office
Schedule VII	Design stage	

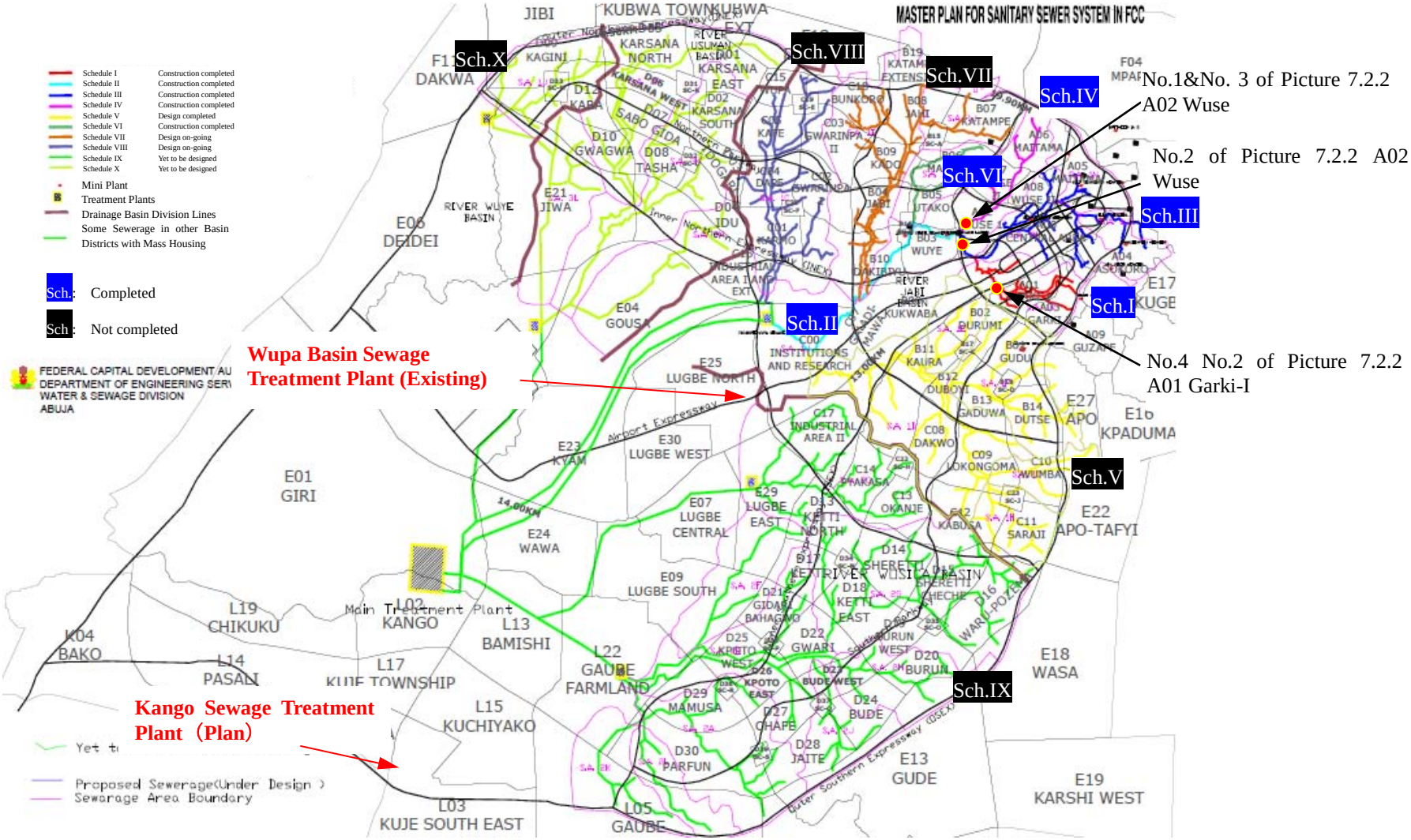
Schedule	Progress	Points to be considered
Schedule VIII	Design stage	
Schedule IX	Yet to be designed	
Schedule X	Yet to be designed	

Source: Documents obtained from FCDA and the result of interview survey with FCDA

In addition, the Wupa Basin Sewage Treatment Plant (with a design capacity of 131,250m^3/day) is serving, but as No.3 of Picture 7.2.1 shows, water inflow is only about 9.5% of the design capacity because the sewer lines which were damaged by erosion and deterioration.

On the other hand, AMP focuses on sewer pipe development only in FCC, so there are no plans for sewer system in the satellite towns. Actually, the satellite towns dominantly rely on septic tanks and not sewer pipes.

The above information is based on the Abuja Sewage System Master Plan and interviews with FCDA, STDD and AEPB.



Source: FCDA and prepared by JICA Study Team based on the existing drawing

Figure 7.2.2 Development Plan of Sewer Lines

7.2.4 Relevant Laws and Regulations

FCDA applies the 'Guidelines for Engineering Consultancy Services, Final Engineering Design of Infrastructure for the Federal Capital Territory Abuja, Nigeria' for planning standard and design criteria like daily-per-capita water consumption and load factor. This has been used as the guideline for technical consulting service. The Guidelines indicates that rate of planed wastewater is calculated based on water consumption. However, criteria on the rate of non-domestic wastewater for institution, commerce, etc. and groundwater is not indicated in the Guideline. Guides on design criteria are not sufficiently provided.

7.2.5 Challenges

7.2.5.1 Challenges on Project Implementation

(1) Treatment Plant

There are the following five treatment plants in FCC:

a) Wupa Basin
b) Guzape
c) Gudu
d) Apo
e) Katampe

As mentioned earlier, the design capacity of the Wupa Basin Sewage Treatment Plant is 131,250m^3/day (sewered population: about 700,000), and those of other plants range from 2,800 to 3,800m^3/day (sewered population: about 15,000 to 20,000).

Due to leakage from the damaged sewer pipes, the wastewater has not reached the sewage treatment plants. Average inflow of wastewater is estimated to be about 9.5% (about 12,500m^3/day as of 24 Jan. in dry season) of the design capacity of the Wupa Basin Treatment Plant (Picture 7.2.1).

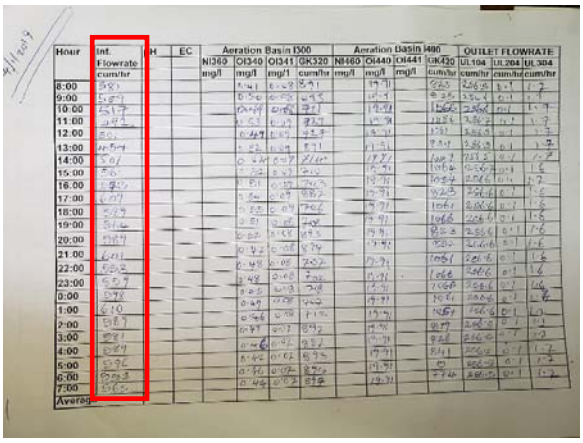
(2) Sewer Pipes

Sewer pipes are basically in a separate system in FCC, but some of sewer pipes are in a combined system due to defective laying. Residual matters which flow in to sewer pipes from outside and the sewer pipes damaged by erosion cause the wastewater leakage from sewer pipes.

In addition, the deteriorated sewer pipes with over 30-35 years since they were laid caused the overflow of wastewater from the broken sewer pipes frequently. Picture 7.2.2 shows the damaged sewer pipes and outflow of wastewater.

No.1 Wupa Basin Sewage Treatment Plant

No.2 Inflow of Wastewater at Wupa Basin Sewage Treatment Plant



No.3 Record of Wastewater Inflow
(Average 520m^3/hr.)

No.4 Drying Bed
(Dried Sludge cannot be observed because of a little Inflow of Wastewater)

Source :JICA Study Team

Picture 7.2.1 Wupa Basin Sewage Treatment Plant

It is very essential that relevant organizations such as FCDA, AEPB learn current status of the existing sewer pipes and identify defective points so as to develop sewer pipes efficiently. FCDA has no ideas on the identified points of cross connections between sewer pipes and storm drains, but is aware of serious deterioration of the sewer pipes of Schedule I, IV and VI as shown in Figure 7.2.2. As a result FCDA has started the preparation to use the fund which may be subsidized by the Ecological Fund Office under Presidency.

In addition, according to AEPB, the diameters of sewer pipes are too small to transport wastewater in AO2 Wuse and A7 Wuse in Schedule IV and AO1 Garki-I in Schedule I, because of the increase of wastewater due to the population growth. Replacement and augmentation of the sewer pipes are urgently required (see Figure 7.2.2).

No.1 Outflow of Wastewater to Public Water Body (Almost Wastewater in Dry Season)

No.2 Overflow of Wastewater from the existing Manhole

No.3 Damaged Manhole

No.4 Flushed Sewer Pipes by Erosion in River Bed

Source :JICA Study Team

Picture 7.2.2 Damaged Sewer Pipes and Current Status of Wastewater Discharged to Public Water Body

7.2.5.2 Challenges on Organizational Aspect

Like the water supply sector, the Engineering & Service of FCDA needs technical assistance to review the AMP as well as formulate a new master plan. The assistance is also important to enable the FCDA to undertake those tasks on its own. However, FCDA and AEPB should be ready to accept their counterparts as a pre-condition for the technical assistance. From the aspect of the late development progress of sewage system such as sewer pipes and treatment, there are concerns on how many staff members can be ensured as counterparts with Japanese side for the review and upgrading of the AMP from the Assistant Director Sewage/Solid Waste, Water & Sewage Infrastructure Department of FCDA.

7.2.5.3 Challenges on Status of Urban Development

The current basic information on sewer service, which has being operated by AEPB are shown in Table 7.2.2.

Table 7.2.2 Basic Information on Sewage Service of AEPB

Items	Basic Information	Remarks
Population	About 3,100,000	Population as at 2019 (Estimated by JICA Study Team)
Beneficiaries	About 46,000	Beneficiaries were estimated based on inflow of 12,500m^3/day, daily per-capita consumption of 230liter and groundwater (15% of total wastewater).
Service Coverage	About 1.5%	Beneficiaries / Population
Monthly Sewage Tariff	Domestic: Naira200 – 3,000/m^3 Commerce: Naira1,000 (Super market) – 300,000 (Hotel)/m^3 Social Institute (Hospital. etc.): Naira1,500 – 4,000/m^3	Sewage tariff system is categorized mainly into three; domestic, commerce, social institutes, etc. Source: “The Federal Capital Territory Reduction of Non-Revenue Water Project in Federal Republic of Nigeria Project Final Report”

Under the above circumstance, regarding the discharge of wastewater in the satellite towns apart from FCC in future, sewer pipes and sanitation facilities should be examined in terms of justification considering cost-effectiveness and extension of urban.

JICA Study Team provisionally estimated future population and wastewater from the year 2025 to 2040, applying 230 litre/capita/day and about 15% of domestic water consumption for non-domestic

water consumption, and about 15% of total wastewater for groundwater as shown in Table 7.2.3. If development of sewer pipes are completed, wastewater of 190,000m^3/day would occur even in 2019, which results in exceeding design capacity (131,250m^3/day) of Wupa Basin Treatment Plant.

Table 7.2.3 Wastewater Prediction in FCC

year	1) Future Pop. (Estimated)	2) Daily per capita Wastewater (L/capita/day)	3) Non-domestic Wastewater (x 1000 L/day) = 1) x 2) x 15%	4) Wastewater (m^3/day) = [1) x 2) + 3) x 1000] /1000	5) Groundwater (m^3/day) = 6) - 4)	6) Wastewater (m^3/day) = 4) / (1- Groundwater ratio: 15%)
2019	620,000	230	21,390	163,990	28,939	192,929
2025	970,000	230	33,465	256,565	45,276	301,841
2030	1,410,000	230	48,645	372,945	65,814	438,759
2035	2,060,000	230	71,070	544,870	96,154	641,024
2040	3,000,000	230	103,500	793,500	140,029	933,529

Source: Estimated by JICA Study Team

Currently, there is extension plan for Kango treatment plant in FCDA. Since its targeted population is about 1.5million, sewered population would be about 2.2million in total in addition to that of Wupa Basin Treatment Plant. Therefore, the rate of wastewater from 3.0miilion persons as of 2040 would exceed the treatment capacity of Wupa Basin and Kango treatment plant.

7.2.5.4 Points to be considered towards Future Plan

(1) Technical Aspect

Sewer lines of Schedule I to Schedule X were planned, but five Schedules have not been developed yet. In future, in order to develop sewer lines in the area apart from FCC, verification of cost effectiveness will be one of challenges in terms of development cost of sewage system and Operation & Maintenance cost.

In addition, since development of sewer system has been behind the original schedule remarkably, the planned capacity of the sewer lines should be reviewed considering quantity of total wastewater in FCC.

The above information is based on site reconnaissance, interviews with FCDA and AEPB with the Abuja Sewage System Master Plan.

(2) Organizational Aspect

AEPB is in charge of Operation & Maintenance of the sewage system. Catchment areas being extended for wasting water due to sewer pipes development and urban development, number of manholes and distance of sewer pipes will be increased indeed. Therefore, Capacity of AEPB should be strengthened for ensuring appropriate Operation & Maintenance as pre-condition for extension of catchment arrears. Specifically, AEPB must examine increase of their staff and assignment.

The above information is based on interviews with AEPB.

Chapter 8 Energy and Communication

8.1 Energy

8.1.1 Upper Plan, Relevant Policy and Projects

8.1.1.1 Upper Plan

The Master Plan for Abuja –The New Federal Capital of Nigeria- (1979)（Hereinafter referred to as 'AMP'）discusses the electrical system in the Federal Capital Territory (FCT) based on two fields: (1) power generation and transmission, and (2) power distribution.

For power generation and transmission field in particular, AMP highlights the following two issues.

(1) Power generation facilities

AMP points out that the power distribution by renewable energy is a realistic and economical way for power distribution to suburb areas. Particularly, solar photovoltaic (PV) system is advantageous and its generation capacities could be 5 to 10 MWp. In addition, the use of 100 MW class conventional power generation facilities, such as steam power generation, gasoline power generation, are advantageous as well for the purpose of both main and backup power sources. However, the use of wind turbine power generation is not recommended due to its high construction cost.

At present, the renewable energy power generation facilities, such as PV is not commonly used in FCT. The JICA Study Team recognizes that large-scale PV systems were not installed except for one unit of 1MWp class grid-connected PV system installed at Lower Usuma Dam water treatment plant. Typical cases of PV use in FCT are limited to the small-scale solar home system for residential and street lighting. According to the discussion with the Federal Ministry of Power, Works and Housing (FMPWH) (Power), the actual generation capacity of which the PV system was installed is unknown. Other large-scale power generation facilities that AMP mentioned do not exist in FCT.

(2) Transmission system

According to AMP, 132 kV transmission lines to FCT are connected from western area, namely Bida and Minna through two circuits. At present, in addition to these two 132 kV circuits, there are two circuits of 330 kV transmission line connected from Shiroro Hydropower Plant to Katampe Substation. One of these two circuits reaches Katampe via Gwagwalada Substation, where other two circuits of 330 kV transmission line are interconnected from Bein Main Substation in Edo State. In addition to the 330 kV transmission line, two circuits of 132 kV transmission line from Gwagwalada Substation to Katampe Substation via Apo Substation are in operation.

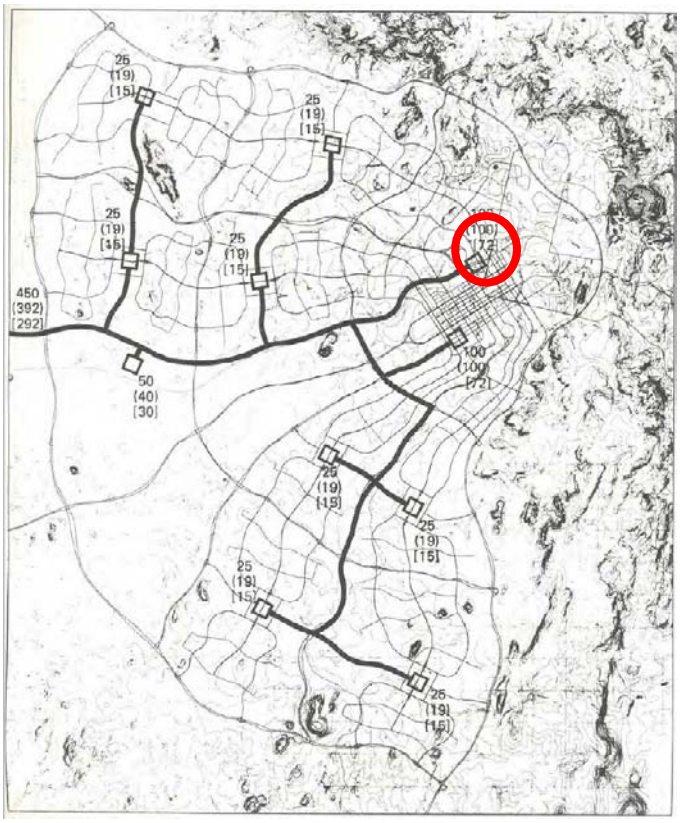
Furthermore, the construction of 2 circuits of the 330 kV line from Akwanga to FCT (New Apo Substation) is in progress. The reliability of the present power supply reliability is higher than that stated in AMP.

As for power distribution, the following two differences are identified.

(1) Number of 132/11 kV substations, capacity and distribution voltage

As Figure 8.1.1 shows, AMP states the construction of eleven substations (132/11 kV) in the Federal Capital City (FCC), which are interconnected by a 132 kV underground power cable network. The capacities of these substations vary from 25 MVA up to 100 MVA depending on the land uses.

The JICA Study Team recognizes that the design concept of the above 132/11 kV substations is to deliver high voltage to the power load center and distribute low-voltage power to the surrounding area. This concept is rationale from power quality point of view (reduction of voltage drop and transmission loss).



Source: AMP
Note 1: Squares (□) in the figure shows locations of 132/11 kV substations. Three numbers show from the top to down the facility capacity (MVA), final demand forecast (MVA) and intermediate demand forecast (MVA), respectively.
Note 2: The substation highlighted by red circle is Central Area Substation (132/33 kV), the only actually constructed substation.

Figure 8.1.1 Proposed Substation Sites in AMP

On the other hand, based on the present distribution network, the Central Area Substation is the only substation in operation among the proposed substations shown in Figure 8.1.1 the substation capacity is 180 MVA, larger than the plan based on AMP, and the secondary voltage is 33 kV. The JICA Study Team recognizes that a higher voltage (33 kV instead of 11 kV) may have been applied considering the distance between the present 132 kV substations and central demand areas, that is FCC area, which is longer than that assumed in AMP.

(2) Distribution facilities design

AMP suggested to use 11 kV underground cables in the central districts along with other public utilities and street lights. However, the utilization of overhead lines was planned at residential areas.

According to the master plan that the Federal Capital Development Authority (FCDA) adopts presently, the entire distribution network regardless of voltage classes will be based on the underground cables.

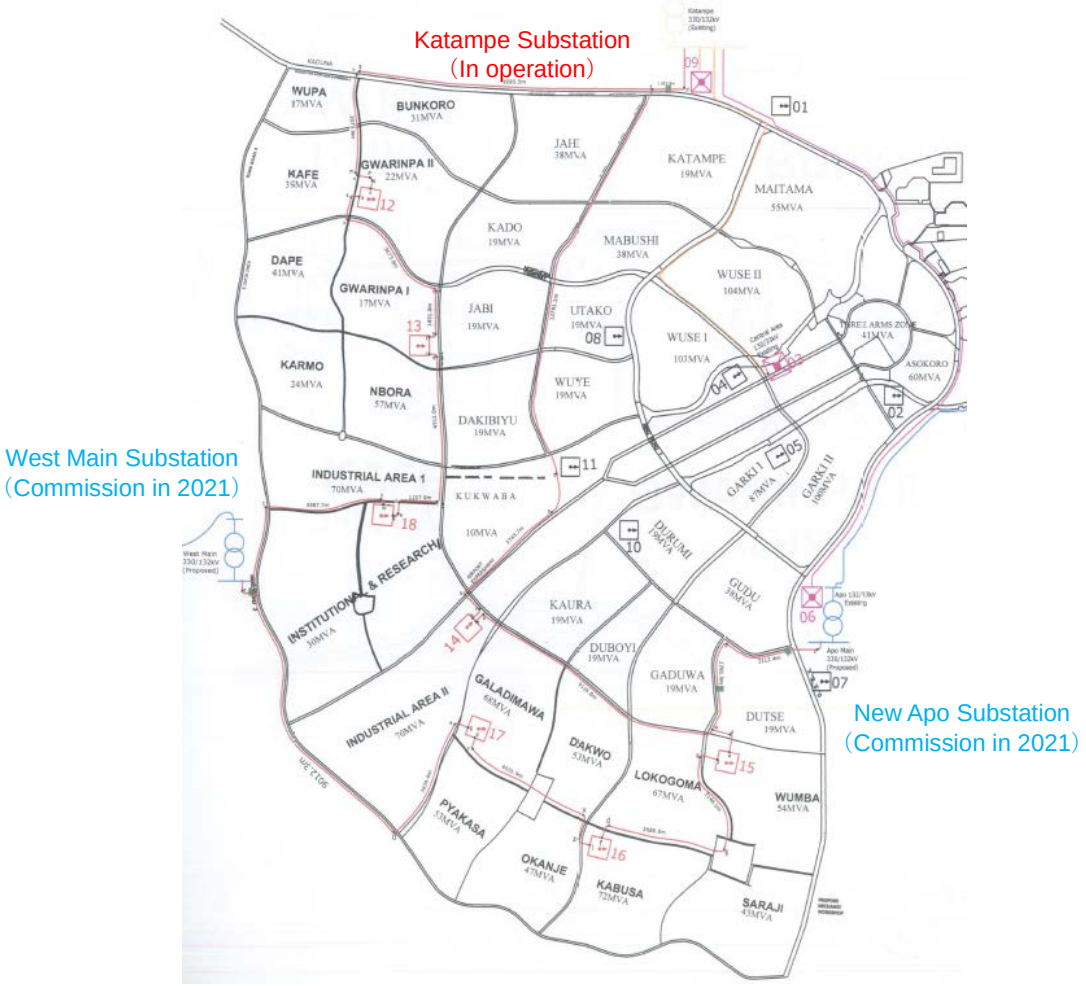
8.1.1.2 Design Concept of Distribution Network in FCC

(1) 132/33 kV substation plan

The Engineering Services Department (ESD) under FCDA is responsible for the distribution plan in FCC. ESD prepared distribution network master plan for Phase I to Phase III, and the latest (Phase III) master plan was formulated in 2011.

Figure 8.1.2 shows the transmission network of Phase I to Phase III area based on the above master plan. 330/132 kV substations namely, Katampe Substation (in operation), West Main Substation (under construction), and New Apo Substation (under construction) step down 330 kV to 132 kV, and the 132 kV

power is supplied to the 132/33 kV substations in the area through the 132 kV underground cables (highlighted by red). The capacities of these substations are shown in Table 8.1.1



Source: Electricity Master Plan for Phase III (2011)
Note : small squares numbered from 1 to 18 shows the locations of 132/33 kV substations (refer to Table 8.1.1)

Figure 8.1.2 132 kV Transmission Network in FCC (Phase I to III)

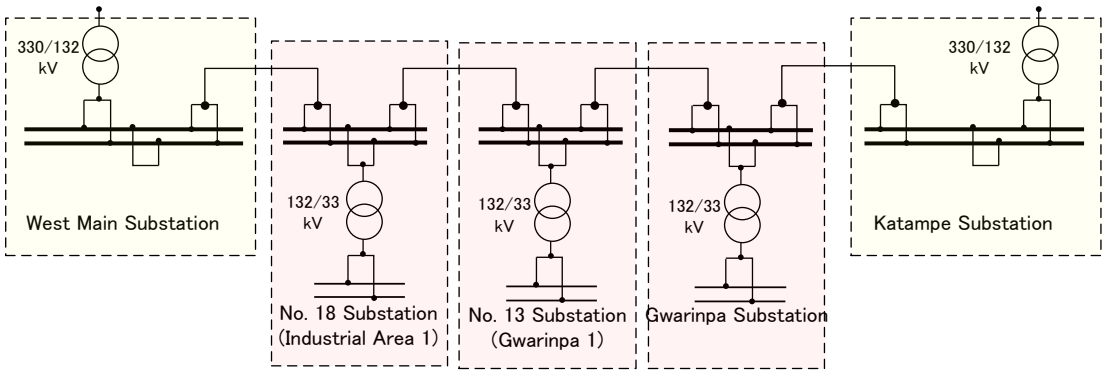
Table 8.1.1 Installed Capacity of 330/132 kV Substations (330/132 kV Transformer Only)

Substation	Rating (kV)	Capacity (MVA)	Available capacity (MVA)
Katampe	330/132	150	450
	330/133	150	
	330/132	150	
West Main	330/132	150	300
	330/132	150	
New Apo	330/132	150	300
	330/132	150	

Source: Prepared by the JICA Study Team based on the discussion with TCN

The interconnection of 132/33 kV substations are designed to be a series arrangement via each 132 kV busbar of 132/33 kV substations, and the origin and the end of 132 kV lines are connected to different 330 kV substations. As an example, the 132 kV transmission line network from the West Main Substation to Katampe

Substation is shown in Figure 8.1.3. The JICA Study Team recognizes that in case that any faults occur in the 132 kV underground cables and/or 132 kV busbars, the power outage area can be minimized since the system allows the 132 kV power supply from both ends.



Source: Prepared by JICA Study Team based on Electricity Master Plan for Phase III（2011）

Figure 8.1.3 Concept of 132 kV Network in FCC

132 kV power shall be supplied through underground cables. At present, the actual 132 kV underground cables are found between Katampe Substation and Central Area Substation.

The distribution of power in the FCC shall be based on the underground cable network, and 33 kV underground cables will be connected to 132/33 kV substations. The Phase III master plan (2011) covers Phase I and Phase II. Basic data of 132/33 kV substations mentioned in this master plan including the current data are shown inTable 8.1.2.

Table 8.1.2 Current Status of 132/33 kV Substations highlighted in the Master Plan

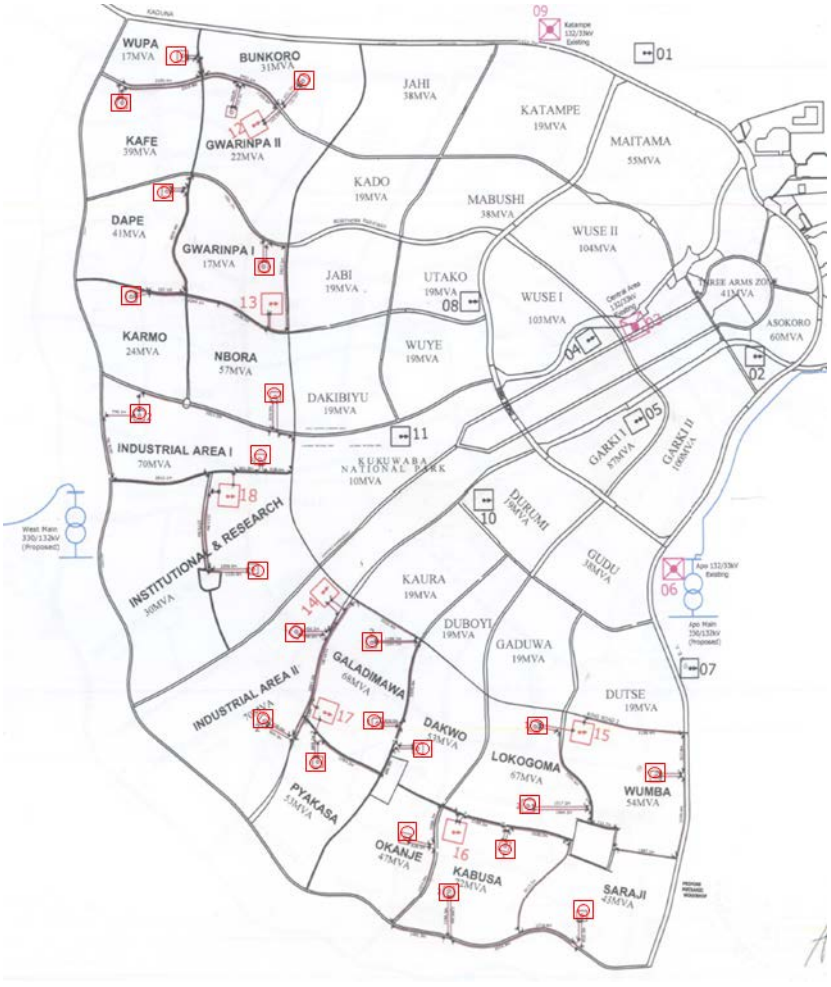
Substation number (from Figure 8.1.4)	Substation name	Capacity based on the master plan (MVA)	Composition of substation facilities based on the master plan	Status
01	-	-	-	Suspended
02	-	-	-	Suspended
03	Central Area	Unknown	Unknown	In operation Capacity:180.0 MVA
04	-	-	-	Suspended
05	-	-	-	Suspended
06	Apo	Unknown	Unknown	In operation Capacity: 250.0 MVA
07	-	-	-	Suspended
08	-	-	-	Suspended
09	Katampe	Unknown	Unknown	In operation Capacity is 220.0 MVA
10	-	-	-	Suspended
11	-	-	-	Suspended
12	Gwarimpa	240	60 MVA x 4 units	Under construction Capacity: 180.0 MVA
13	-	240	60 MVA x 4 units	No detail plan
14	Kukwaba	240	60 MVA x 4 units	In operation Capacity: 120.0 MVA
15	Wuumba	240	60 MVA x 4 units	Under construction Capacity: 180.0 MVA
16	-	240	60 MVA x 4 units	No detail plan
17	-	240	60 MVA x 4 units	No detail plan
18	-	240	60 MVA x 4 units	No detail plan

Source: JICA Study Team

As Table 8.1.2 shows, while there are substations which TCN recognizes and are under construction (such as Gwarimpa Substation and Wuumba Substation), there are others which TCN does not recognize and with no detail information on their plan and progress (such station number 13, 16, 17, and 18). Furthermore, the actual substation capacities differ from the master plan.

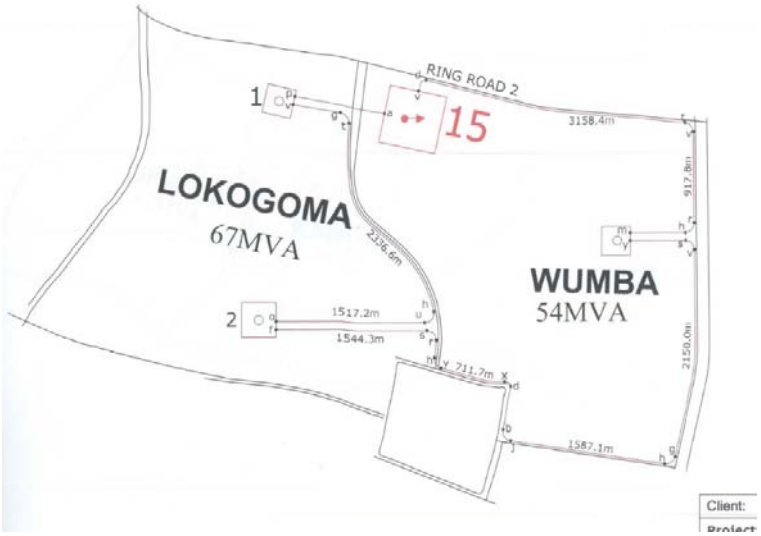
(2) 33 kV distribution line and 33/11 kV substation plan

Figure 8.1.4 shows the 33 kV distribution network. The 132/33 kV substations shown in Figure 8.1.2 supplies power to districts surround the substation. Figure 8.1.5 shows an example of the 33 kV distribution network map, and Figure 8.1.11shows the single line diagram (of the 33 kV network form of Wumba Substation).



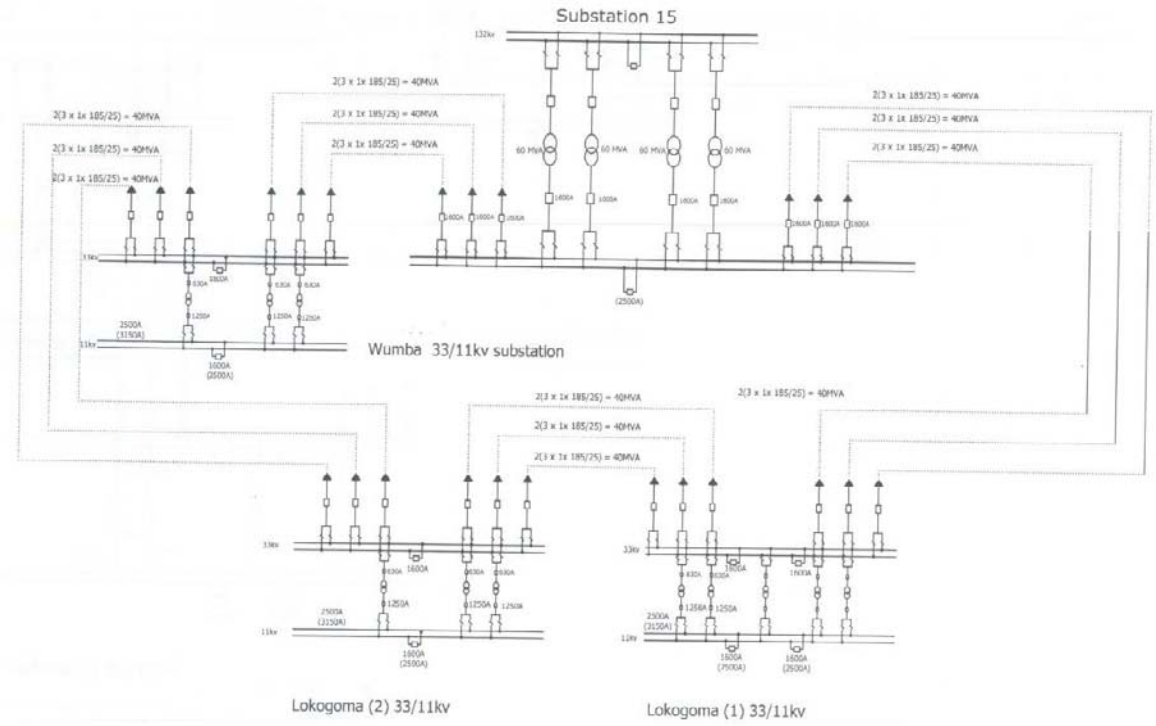
Source: Electricity Master Plan for Phase III（2011）
Note: Squares (▯) shows the locations of 33/11 kV substations

Figure 8.1.4 33 kV Distribution Network in FCC



Source: Electricity Master Plan for Phase III（2011）

Figure 8.1.5 33 kV Distribution Network connecting to the Secondary Side of Wuumba Substation



Source: Electricity Master Plan for Phase III（2011）

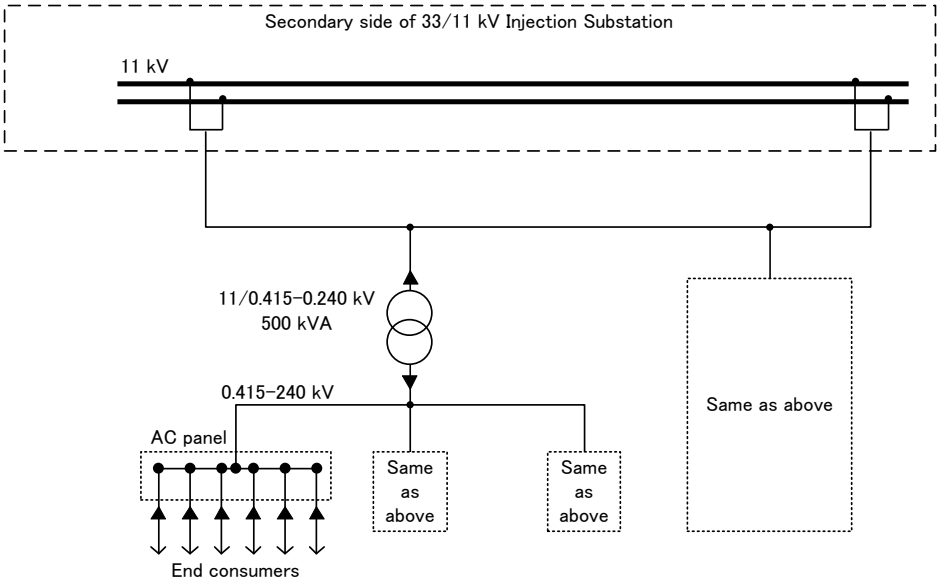
Figure 8.1.6 Single Line Diagram of Distribution Network connecting to Wuumba Substation

The 33 kV distribution network forms a ring system. The 33 kV double busbars of Wuumba Substation acts as both the starting point and the ending point. In case of Wuumba Substation, three 33/11 kV substations in total interconnect.

The master plan also conducts the power flow analysis on 33 kV distribution network. According to the result of this analysis, the lowest voltage of the 33 kV busbars is 97.86% against the rated voltage, showing the high quality of electricity. This quality is realized because of the existence of sufficient number of 132/33 kV substations in the area, and the fact that the power distribution distances are short, leading to the minimization of voltage drops.

(3) 11 kV and low voltage distribution network

System arrangement of 11 kV distribution line, 11/0.415-0.240 kV transformers and low voltage lines is shown in Figure 8.1.12. Just like 33 kV distribution network, the start point and end point of the 11 kV underground cables are connected to the 33/11 kV switchgear, forming the ring system. Along with the 11 kV distribution lines, several units of 11/0.415-0.240 kV transformers are interconnected. The standard capacity of 11/0.415-0.240 kV transformer is 500 kVA. The low voltage line (0.415-0.240 kV) is comprised of trunk line, AC panel and branch line. Firstly, low voltage power is supplied to an AC panel through trunk line, and secondly, the distribution power is supplied to each consumer from the AC panel through branch line. The number of consumers per AC panel is from 4 to 6 on average. Depending on the load, the number of consumers to be connected to one transformer varies. The allocation of transformers is designed so that the transformer's demand factor will be 75%.



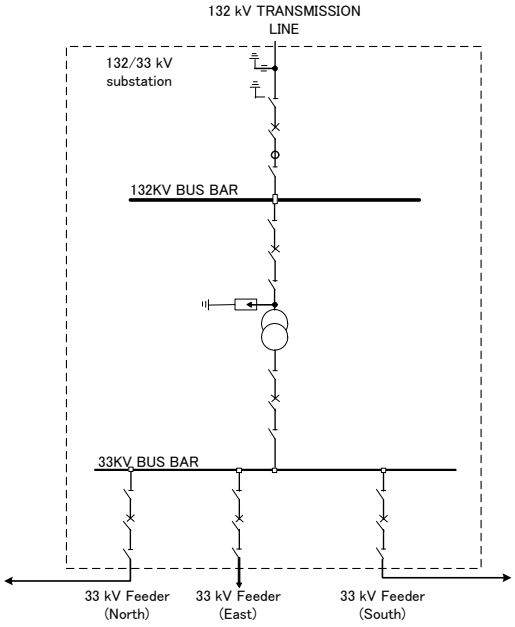
Source: Prepared by the JICA Study Team

Figure 8.1.7 Concept of 11 kV-Low Voltage Distribution Network

8.1.1.3 Design Concept of Distribution Network in Satellite Towns

(1) Basic concept of distribution network master plan

The Satellite Town Development Department (STDD) under FCDA is responsible for the distribution plan in the satellite town. In the satellite towns, 33 kV overhead lines act as the main power supply line from 132/33 kV. Examples of 132/33 kV substation and outgoing 33 kV feeders are shown inFigure 8.1.13. 33 kV power stepped down at 132/33 kV substation is delivered to various directions through 33 kV overhead lines (feeders).



Source: JICA Study Team

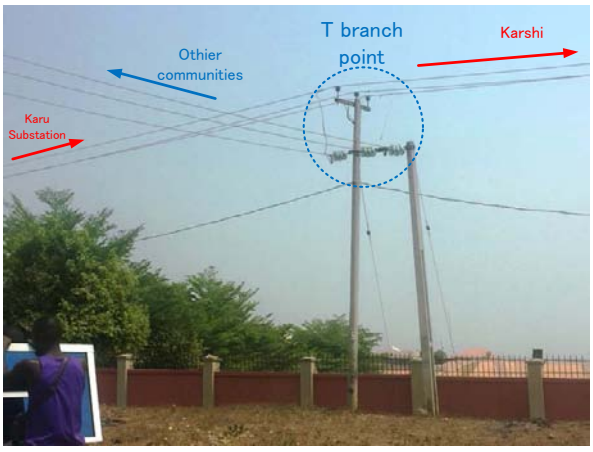
Figure 8.1.8 Typical Example of 132/33 kV Substation and 33 kV Feeders

STDD does not prepare the distribution network master plan for the entire satellite towns area. However, STDD formulates the outline design of the distribution network rehabilitation for a specific area. STDD calls it as a master plan for that area. The JICA Study Team conducted the survey at Karshi where the master plan had already been prepared. According to STDD, the design concept of the distribution network in Karshi is regarded as a typical example for further upgrading of the distribution network in the satellite towns. The STDD's design concept based on the case of Karshi area should be studied.

(2) Present situation of 33 kV distribution network and future plan

Karu Substation (132/33 kV) is the distribution power source to Karshi area. There are three to four communities living between the substation and Karshi (approx. 20 km length) to whom the power is supplied through T branches from one circuit of 33 kV distribution line to Karshi area (Photo 8.1.1). The power is distributed within the community through 33/11 kV packaged substation and/or 33/0.415-0.240 kV transformers located in each community.

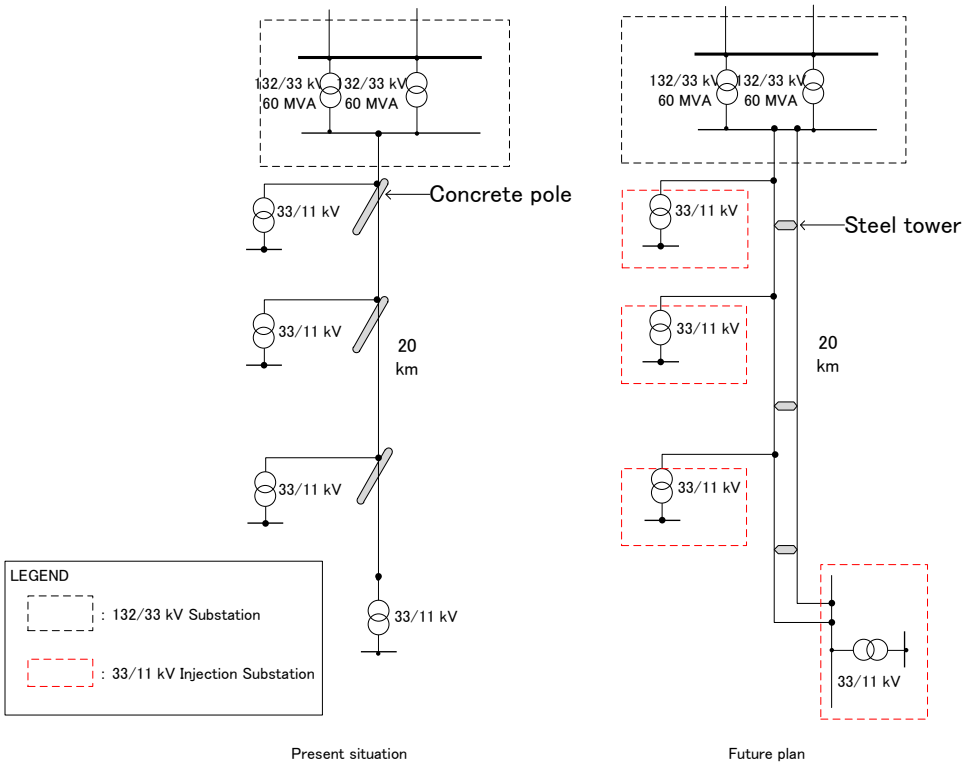
Based on this system, the JICA Study Team recognizes that as the power demand increase in line with the population growth, the 33 kV feeders will be evidently overloaded and could hamper the power supply in the end.



Source: JICA Study Team

Photo 8.1.1 Typical T Branch for Power Distribution to Various Communities

STDD is currently planning to replace the existing concrete poles of 33 kV feeders by steel gantries and construct 2 circuits of 33 kV overhead lines. Both circuits are planned to reach Karshi, one line supplying power mainly to the communities and the other dedicated to Karshi, where the biggest power demand is foreseen. Through this concept, the distribution facilities will satisfy the future power demand and the power supply reliability will improve as well.Figure 8.1.17 illustrates the present and future distribution network planning.



Source: JICA Study Team

Figure 8.1.9 Concept of 33 kV Distribution Line Upgrading Reaching Karshi

(3) Distribution network concept in Karshi

As an example of distribution network in the satellite towns, the design of Karshi area is studied. According to STDD, the design of the distribution of power in the satellite towns is made as follows:

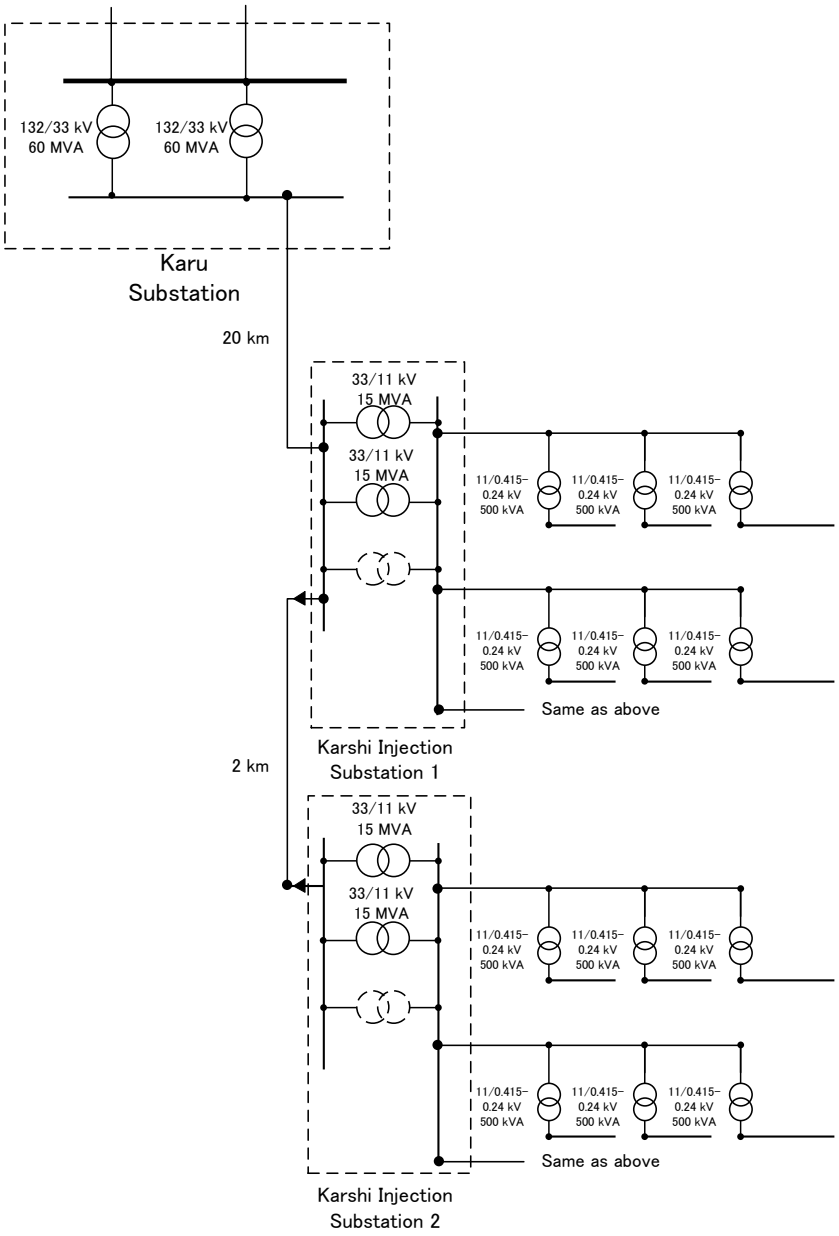
i. 33 kV overhead lines is extended from a 132/33 kV substation to a community and finally connected to a 33/11 kV injection substation.
ii. 33 kV power is stepped down to 11 kV at the injection substation and supplied to various areas in the community through 11 kV overhead lines.
iii. Finally, 11 kV power is stepped down to 0.415-0.240 kV (LV) and supplied to each consumer.

In the satellite towns, overhead line facilities form the distribution network. Also, whilst 33 kV and 11 kV distribution network are designed as a ring system in case of FCC, the basic design of the satellite towns is based on a radial system regardless of the voltage classes.

Figure 8.1.10 shows the distribution network of Karshi proposed by the master plan. After the installation of 33 kV overhead line to Karshi, it will be connected to the Karshi Injection Substation 1 which will be located at the boarder of Karshi area toward Karu Substation. The line from Karshi Injection 1 is then connected to the Karshi Injection Substation 2, which will be constructed in a relatively central area of Karshi, by 2 km of 33 kV underground cables.

As stated above, utilization of overhead lines is standardized. However, 11 kV and low voltage overhead lines shall be jointly installed in gantries between Karshi Injection Substation 1 and Karshi Injection Substation 2. It is not feasible to install three different voltage overhead lines on the same gantry structures from the

viewpoint of power supply reliability as well as economic design of these structures. Therefore, the JICA Study Team recognizes that underground cables for 33 kV distribution circuits were adopted for the distribution network.



Source: Prepared by the JICA Study Team based on discussion with STDD

Figure 8.1.10 Distribution Network in Karshi Area

Adequate number of 11 kV distribution lines (feeders) shall be extended to various power distribution areas in Karshi. The number of 11 kV feeders shall be determined based on the forecasted power load, locations, etc.

11 kV distribution network shall be interconnected to 11/0.415-0.240 kV packaged substations through a T branch. Low voltage network shall be a radial system comprising of trunk line and branch lines leading to each consumers.

The standard capacity of 11/0.415-0.240 kV transformers is 500 kVA. The number of transformer unit shall be determined in accordance with the forecasted power load.

The land for 33/11 kV injection substations stated above shall be owned by the FCT, and FCDA should have the right to use them. The acquisition of land for 33 kV underground cable routes has also been completed, and the proposed sites for substations are shown in Photo 8.1.2 and Photo 8.1.3

Photo 8.1.2 Proposed Site for Karshi Injection Substation-1

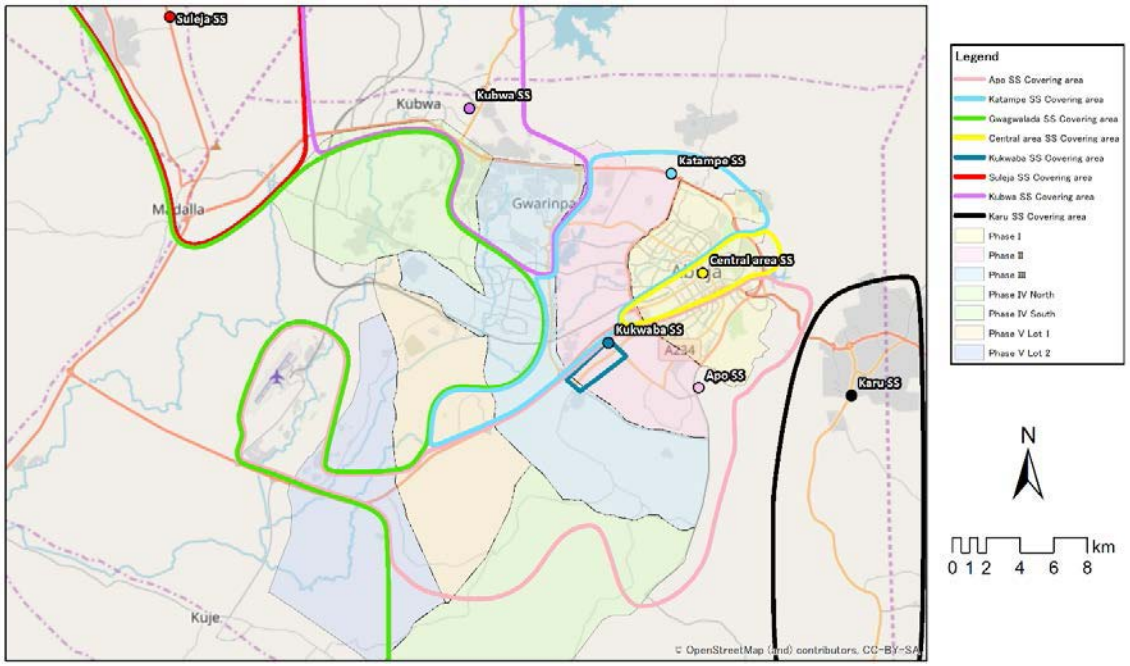
Photo 8.1.3 Proposed Site for Karshi Injection Substation-2

8.1.1.4 Outline of Electrical Sector in Nigeria and Transmission and Distribution Network in FCT

(1) Transmission and substation network

In Nigeria, the highest voltage of the transmission network is 330 kV. Thermal power generation plants located in the southern part and hydropower plants in the western part primarily supply power throughout the nation. The FCT power is supplied from these power plants through the long-distance transmission lines.

The Transmission Company of Nigeria (TCN) operates transmission network (330 kV and 132 kV) and transmission substations, such as 330/132/33 kV and 132/33 kV substations. These transmission substations supply power to the distribution network in FCT. Figure 8.1.11 illustrates locations of the transmission substations and their approximate power supply area. In reality, however, the power distribution feeders to some of the areas are extended from different power sources (transmission substations). Thus, this figure should be considered as reference only.



Source: Prepared by the JICA Study Team based on the discussion with Abuja Electricity Distribution Company (AEDC)

Figure 8.1.11 Locations of Transmission Substations and Power Supply Area

At present, TCN oversees the new construction of transmission substations in FCT. Table 8.1.3 shows the list of transmission substations up to 2040 based on the present plan. The current power supply capacity is 1272.5 MVA, and it is expected to grow to 2,052.5 MVA after the completion of new substations.

Table 8.1.3 List of Transmission Substations in FCT

Substation	Capacity (MVA)	Remark
Katampe	220.0	In operation
Gwagwalada	120.0	In operation
Apo	250.0	In operation
Central area	180.0	In operation
Kukwaba	120.0	In operation
Kubwa	120.0	In operation
Suleja	142.5	In operation
Karu	120.0	In operation
West main	180.0	To be commissioned in 2021
New Apo	180.0	To be commissioned in 2021
Gwarimpla	120.0	To be commissioned in 2021
Kuje	180.0	To be commissioned in 2021
Wuumba	120.0	To be commissioned in 2021

Source: Prepared by JICA Study Team based on the technical discussion with TCN

(2) Present situation of distribution network construction

Distribution network upgrading work is conducted by the Abuja Electricity Distribution Company (AEDC), and the FCDA constructs temporary facilities. The work conducted by FCDA does not abide by the distribution network master plan and the decommissioning is expected in the future. In the satellite towns, the ongoing distribution network upgrading work is in line with the master plan, as observed in Karshi.

(3) Donor's aistance

There is an ongoing donors' project in FCT is called 'Abuja Power Supply Scheme Transmission Project' funded by the Agence Française de Developpement (AFD). Table 8.1.4 shows the scope of this project. All the lots are scheduled to be completed by 2021 and to be handed over to TCN accordingly.

Table 8.1.4 Scope of Abuja Power Supply Scheme Transmission Project

Lot Number	Main scope	Remark
1	• Construction of 2 circuits of 330 kV transmission line • (Lafia Substation to New Apo Substation: 132 km)	
2	• Construction of 2 circuits of 132 kV transmission line (Apo Substation to New Apo Substation: 11 km) • Construction of 2 circuits of 132 kV transmission line (New Apo Substation to Kuje Substation: 42 km) • Construction of 2 circuits of 132 kV transmission line (Kuje Substation to West Main Substation: 29 km)	
3	• Construction of New Apo Substation (2 units of 330/132/33 kV transformer (150 MVA)) • Extension of 132 kV bay at Apo Substation, and extension of 330 kV bay at Lafia Substation	New Apo Substation will be constructed in the satellite towns (near the border of FCC).
4	• Construction of West Main Substation (2 units of 330/132/33 kV transformer (150 MVA), 3 units of 132/33 kV transformer (60 MVA))	West Main Substation will be constructed in FCC.
5	• Construction of Kuje Substation (3 units of 132/33 kV transformer (60 MVA)) • Construction of Wuumba Substation (2 units of 132/33 kV transformer (60 MVA))	Kuje Substation will be constructed in FCC. Wuumba Substation will be constructed in FCC.

Lot Number	Main scope	Remark
6	• Construction of Gwarimpa Substation (2 units of 132/33 kV transformer (60 MVA)) • Installation of 132 kV underground cables • (Katampe Substation to Gwarimpa Substation: 4 km)	Gwarimpa Substation will be constructed in the satellite towns (near the border of FCC).

Source: Prepared by the JICA Study Team based on the data provided by TCN

Unlike the transmission network, according to FCDA, none of donors is assisting the distribution network. However, the Federal Ministry of Power, Works and Housing (Power) started 'Distribution Expansion Program' in 2018 for the purpose of reinforcement of the distribution network. This program will facilitate the procurement and installation of distribution facilities (Distribution lines and transformers) by 11 power distribution companies in Nigeria. According to the discussion with the ministry, the following FCT projects were approved:

- Construction of 6 km 33 kV overhead line from Kukuwaba 132/33 kV transmission substation to Economic and Financial Crime commission (EFCC) Corporate Headquarters
- Construction of 18.5 km 33 kV overhead line from Gwagwalada 132/33 kV transmission substation to the University of Abuja and Tee-off to Mini Campus, and supply and installation of 2.5 MVA 33/11 kV transformer at the University of Abuja Mini campus.

(4) Review of FCDA's power demand forecast

FCDA utilizes engineering consultants to prepare the outline design drawings of the distribution network in FCC by phase. The power demand forecast by phase is included in this outline design. Through this document, the result of power demand forecast for Phase I, Phase II, and Phase III conducted by FCDA was confirmed.

FCDA calls the outline design drawings stated above as the master plan. According to the discussion with FCDA, the JICA Study Team recognizes that the power demand forecast is conducted based on the following procedures:

i. URP of the FCDA has the list of power demand (kVA) per unit area by land-use category (residential, schools, religious, etc.) and the extent of the land-use development.
ii. The final land use of a district for which the power demand is to be forecast is assumed. Based on this assumption, the engineering consultant prepares a drawing called 'Land Use Plan', and Figure 8.1.12 shows an example of this plan.
iii. The total area of each land-use category is calculated and multiplied by respective power demand rate stated in procedure (i) above. The total demand is forecast by summing up the demand of all land-use categories.
The power demand forecast for the satellite towns follows the same procedure, but since the demand in the satellite towns is relatively smaller than that of FCC, the coefficient is modified for the satellite towns.

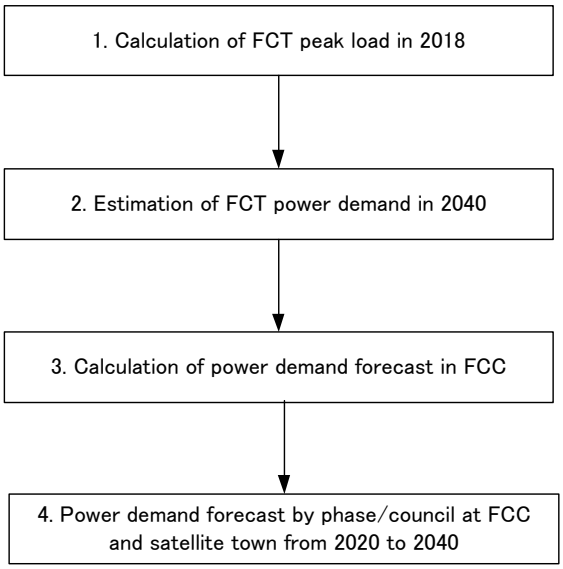
If the above procedure is applied, the peak time of the power demand may vary by land category, and the above calculation may not have considered this. The above power demand, however, may have been forecasted based on the assumption that all the peak demands by categories occur at the same time, and as a result the power demand forecast of the district could be overestimated. In the following section, it assumed that the above power load by area has already been modified based on the diversity factor for power load.

Source: Jahi District Tender Drawings (2007)

Figure 8.1.12 Example of Land Use Plan（Jahi District, Phase II）

(5) Rough estimation of power demand forecast by 2040

The JICA Study Team forecasted the population growth in FCT, and based on this forecast, rough estimation of the power demand in FCT by 2040 will be forecast. The forecast work flow is shown in Figure Figure 8.1.13.



Source: JICA Study Team

Figure 8.1.13 Work Flow of Power Demand Forecast (Rough Estimate)

Contents of the work are shown below.

Work contents	Outline
1. Calculation of FCT peak load in 2018	Based on the actual power load in December 2018, the power demand in 2018 is calculated.
2. Estimation of FCT power demand in 2040	'Draft final report on the Project for Master Plan Study on National Power System Development in the Federal Republic of Nigeria (October 2018)' (Hereinafter referred to as 'MP Report')

	states the power demand growth rate of areas maintained by different power distribution companies in Nigeria. For the power demand growth rate in FCT, the rate for Abuja Electricity Distribution Company (AEDC) will be used.
3. Calculation of power demand forecast in FCC	Power demand forecast by each phase is calculated through the modification of FCDA's power demand forecast for 2040, and the assumption that the power demand forecast of Phase IV and Phase V will be equivalent to that of Phase III as Phase IV and Phase V are situated in a relatively suburb part of FCC just like Phase III.
4. Power demand forecast by phase/council of FCC and satellite towns from 2020 to 2040	Finally, the power demand forecast by different councils is calculated.

The result of the above procedure is shown below.

1. Calculation of FCT peak load in 2018

The JICA Study Team obtained the data of peak load in 2018 with the recorded date and time for 132/33 kV transformers primarily supplying the power to FCT from TCN. The JICA Study Team recognizes that the actual peak demand time varies by transformer, but the peak demand of the transmission system is usually recorded at nighttime in Nigeria (20:00 PM to 22:00 PM). Therefore, as for these transformers which recorded the peak load outside the above-stated time period, the load values are multiplied by 0.8 to adjust the demand to the power load during the system peak time (20:00 PM to 22:00P M). Finally, the load is converted to power demand by the application of 20% as the distribution loss. The measured data and modified load of each transformer are shown in Table 8.1.5. As the table shows, the peak power demand in 2018 is determined to be 493.36 MVA.

Table 8.1.5 Peak Power Load in FCT in 2018

Substation name	Trans. name	Available capacity (MVA)	Voltage ratio	Measured data		Mod. Coff.	Calculated data at the system peak time	
				Max demand (MVA)	Day & Time recorded		Max demand (MVA)	Day & Time recorded
Katample	T1A	60	132/33	18.89	20:00	1.00	18.89	Peak
	T2A	60	132/33	18.89	20:00	1.00	18.89	Peak
	TR3	100	132/33	31.48	20:00	1.00	31.48	Peak
Gwagwalada	T1A	60	132/33	-				
	T2A	60	132/33	37.63	21:00	1.00	37.63	21:00
Apo	T1	45	132/33/11	32.88	11:00	0.80	26.30	Peak
	T2	45	132/33/11	32.88	11:00	0.80	26.30	Peak
	T3	60	132/33	58.75	13:00	0.80	47.00	Peak
	T4	100	132/33	49.50	21:30	1.00	49.50	20:00
Central area	T1	60	132/33	46.25	17:00	0.80	37.00	Peak
	T2	60	132/33	46.25	17:00	0.80	37.00	Peak
	T3	60	132/33	35.00	14:00	0.80	28.00	Peak
Kukwaba	TR1	60	132/33	39.50	21:00	0.80	31.60	Peak
	TR2	60	132/33	14.25	15:00	0.80	11.40	Peak
Kubwa	TR1	60	132/33	56.13	16:00	0.80	44.90	Peak
	TR2	60	132/33	-				
Suleja	T1	7.5	132/11	8.50	5:00	0.80	6.80	Peak
	T2	45.0	132/33	32.25	9:30	0.80	25.80	Peak
	T3	30	132/33	21.25	20:00	1.00	21.25	20:00
	T5	60	132/33	41.38	20:30	1.00	41.38	20:30
Karu	TR1	60	132/33	40.38	19:00	0.80	32.30	Peak

Substation name	Trans. name	Available capacity (MVA)	Voltage ratio	Measured data		Mod. Coff.	Calculated data at the system peak time	
				Max demand (MVA)	Day & Time recorded		Max demand (MVA)	Day & Time recorded
	TR2	60	132/33	54.13	16:00	0.80	43.30	Peak
Total load (MVA)							616.70	-
Peak demand (MVA)							493.36	

Source: Prepared by the JICA Study Team based on the data provided by TCN
Note: Peak demand is calculated by multiplying the total load by 0.8 (0.2 is equivalent to distribution loss).

2. Estimation of FCT peak demand in 2040

'Draft Final Report on the Project for Master Plan Study on National Power System Development in the Federal Republic of Nigeria' (herein after referred to as 'MP Report') forecasts the power demand growth rate until 2040, and Table 8.1.6 shows the power demand growth rate per person in AEDC.

Table 8.1.6 Power Demand Growth Rate per Person in AEDC

	2020	2020-2025	2025-2030	2030-2035	2035-2040
Growth rate (%/year)	9.1	14.5	8.6	6.1	5.8

Source: MP Report

Based on Table 8.1.6 the future FCT power demand is calculated (that is the sum of power demand forecasts for FCC and the satellite towns). The result is shown in Table 8.1.7.

Table 8.1.7 Power Demand Forecast in FCT by 2040

	2020	2025	2030	2035	2040
Peak demand（MVA）	588	1,155	1,746	2,347	3,112

Source: JICA Study Team

3. Calculation of power demand forecast in FCC

As stated in item (4) under section 8.1.1.4, FCDA conducted power demand forecast for Phase I, Phase II, and Phase III. The result shows the demand will be 550 MVA, 333 MVA, and 875 MVA respectively. If the power demand in Phase IV and Phase V are assumed to be equivalent to that of Phase III (875 MVA), the total power demand in FCC will be 3,508.

However, FCDA's power demand forecast does not specify the target year. According to FCDA, this power demand shall occur when the city fully matures in the future, which, the JICA Study Team recognizes, takes lots of time.

Therefore, based on the field survey and discussion with counterpart, it is assumed that this power demand will be realized in 2065. Through the application of the power demand growth rate of FCC, the power demand in FCC from 2020 to 2040 will be forecast.

The FCC population is projected to increase by 6% to 7% annually. This puts Nigeria at the top of the other countries with similar economic development with Nigeria in terms of the elasticity of power demand growth rate to the population growth rate. Accordingly, the power demand growth rate is assumed to be 6% per year from 2018 to 2040. After 2040, the growth rate is assumed to be 5%. The result is shown in Table 8.1.8.

Table 8.1.8 Power Demand Forecast in FCC

	2020	2025	2030	2035	2040
Power load(MVA)	320	428	573	767	1,026

Source: JICA Study Team

4. Power demand forecast by phase/council of FCC and satellite towns from 2020 to 2040

The power demand forecast of the satellite towns is calculated by subtracting the FCC power demand forecast from that of FCT. Furthermore, the power demand in each phase of FCC and councils of the satellite towns is calculated based on the following assumption:

i. FCC

Total power demand forecast shall be divided in proportion to the FCDA's power demand forecast (final demand forecast values).

ii. Satellite towns

As the peak demand occurs in the evening, the majority of power consumption depends on the residence use. Therefore, the power demand forecast will be divided in proportion to the population of each council.

The result is shown in Table 8.1.9

Table 8.1.9 Result of Rough Estimate of Power Demand Forecast in FCT

Unit: MVA

		2020	2025	2030	2035	2040
FCC	Phase I	39	53	70	94	126
	Phase II	24	32	43	57	76
	Phase III	63	84	112	150	201
	Phase IV	63	84	112	150	201
	Phase V	63	84	112	150	201
	Subtotal	**251**	**335**	**449**	**601**	**804**
Satellite Town	Amac	146	337	507	708	926
	Abaji	8	17	23	29	37
	Bwari	69	165	263	347	446
	Gwagwalada	46	111	171	226	300
	Kuje	55	158	274	360	501
	Kwali	13	33	58	76	98
	Subtotal	**337**	**820**	**1,297**	**1,746**	**2,308**
FCT Total		**588**	**1,155**	**1,746**	**2,347**	**3,112**

[Remark] Power demand forecasts of Phave IV and Phase V shall be equal with that of Phase III since the power demnad of forecasts of Phase IV and Phase V areas are assumed to be the same with Phase III.

Source: JICA Study Team

According to the above analysis, a large power demand growth is expected in satellite towns especially. Around 2030, the sum of total power demand and the distribution loss in FCT will exceed the total substation capacity of 132/33 kV substations supplying power to the distribution network as Table 8.1.3 indicates, and the JICA Study Team recognizes that the upgrading of the transmission substation facilities will be necessary.

8.1.2 Organization and Work Demarcation

8.1.2.1 Basic data of energy in FCT

During the field survey period, the JICA Study Team did not obtain the latest basic data on energy in FCT due to the difficulties of arranging the discussion with Abuja Electricity Distribution Company (Abuja DISCO). Therefore, the basic data are described below based on the JICA Study Team's understanding confirmed by reviewing relevant reports and observations through the survey held in January 2019:

- Electrification rate:

According to MP Report, the electrification rate throughout the nation is approx. 61%. FCT is categorized as urbane area where the electrification rate is assumed to be relatively high. However, the illegal settlement area is not nominal and the present number of houses connecting to the grid network in the area is not clearly identified. Therefore, regardless of its location, the JICA Study Team recognizes that the electrification rate at FCT does not differ from that rate for the entire nation.

- Power outage rate:

The JICA Study Team did not obtain the data from Abuja DISCO. According to the discussion with TCN held on July 2018 by Yachiyo Engineering Co., Ltd., it was pointed out that Abuja DISCO prioritized to supply

power to the area where the power meters are well equipped rather than the area where the power meters were not sufficiently equipped to secure the collection of electricity tariff from consumers.

According to the interviews held at Karshi area, suburb of the FCT in January, 2019, the longest duration of power outage reached up to three continuous days. This information could proof the contents of the above discussion with TCN. The JICA Study Team recognizes that the actual power outage rates vary depending on areas and thus it is difficult to identify the unique power outage rate for FCT.

- Electricity tariff:

According to MP Report, Nigeria adopt the electricity tariff scheme called Multi Year Tariff Order (MYTO). Based on MYTO, electricity tariffs (unit price of kWh) vary depending on monthly energy use, category of consumers (resident, commercial, industrial, etc.). In case of year 2018, the electricity tariff for residence up to 50 kWh is merely 4 Naira/kWh as it is considered to be indispensable for continuing the minimum requirement of lives. However, the tariff shall increase up to 19.75 Naira/kWh if the power is used beyond 50 kWh per month. The electricity tariffs for commercial and industrial purposes shall vary depending on the receiving voltage and it ranges from 22 to 32 Naira/kWh.

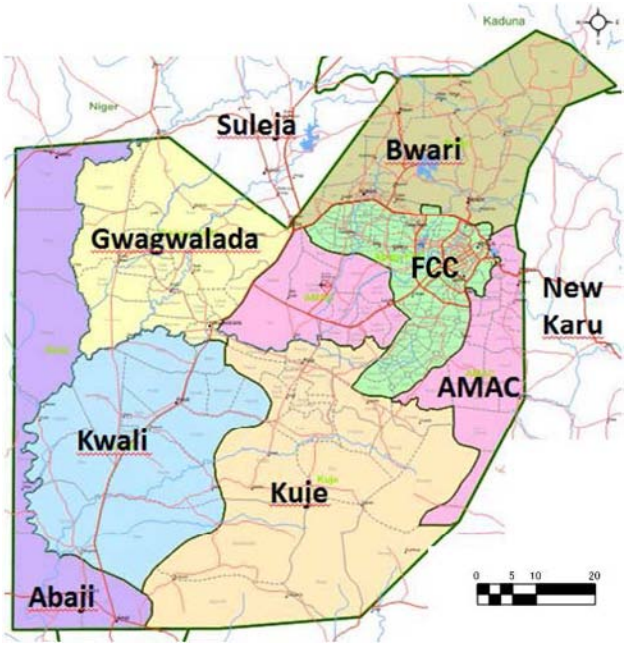
- Tariff collection rate:

According to MP Report, the tariff collection rate throughout the nation is 62% and this figure tends to be higher in urbane area. Therefore, the JICA Study Team recognizes that the tariff collection rate at FCT is higher than this figure, but the actual collection rate is not studied.

8.1.2.2 Overview

FCT is divided into two areas: Federal Capital City (FCC) and satellite towns. FCC forms central area of FCT and mainly consists of governmental entities, residential area, etc. FCC is furthermore divided into five phases in line with the urban development priority.

The satellite towns is situated outside the FCC and comprised of six area councils namely Amac, Bwari, Kuje, Gwagawalada, Kwali and Abaji. Figure 8.1.14 shows the satellite towns and FCC, and Figure 8.1.15 shows areas of Phase I to Phase V in FCC.



Source: Nigeria Infrastructure Advisory Facility Project Concept Note

Figure 8.1.14 Map of FCT (6 Area Councils and FCC)

Source: Prepared by the JICA Study Team

Figure 8.1.15 Map of Phase I to Phase V in FCC

Power distribution work is comprised of two works: planning, and operation and maintenance (O&M). FCDA is in charge of the planning and AEDC is in charge of the O&M. According to ESD, different FCDA departments are responsible for the planning of FCC and the satellite towns.

The Engineering and Services Department (ESD) of FCDA is in charge of the planning for power distribution in FCC. The Electrical Infrastructure (North) Division and Electrical Infrastructure (South) Division under ESD manage the northern part and the southern part of FCC respectively. Geographically, the border of the northern and the southern parts are Constitutional Avenue/ Independence Avenue located in the centre of FCC. In practice, however, two deputy directors, who are responsible north and south, jointly oversee the entire FCC area.

The planning work for the satellite towns is conducted by the Electrical and Mechanical Division, STDD of FCDA.

As stated earlier, AEDC conducts the O&D after the unbundling of electric sector in 2015. AEDC is responsible for the entire FCT area, i.e. FCC and/or the satellite towns.

8.1.2.3 Work Demarcation between ESD and AEDC (FCC)

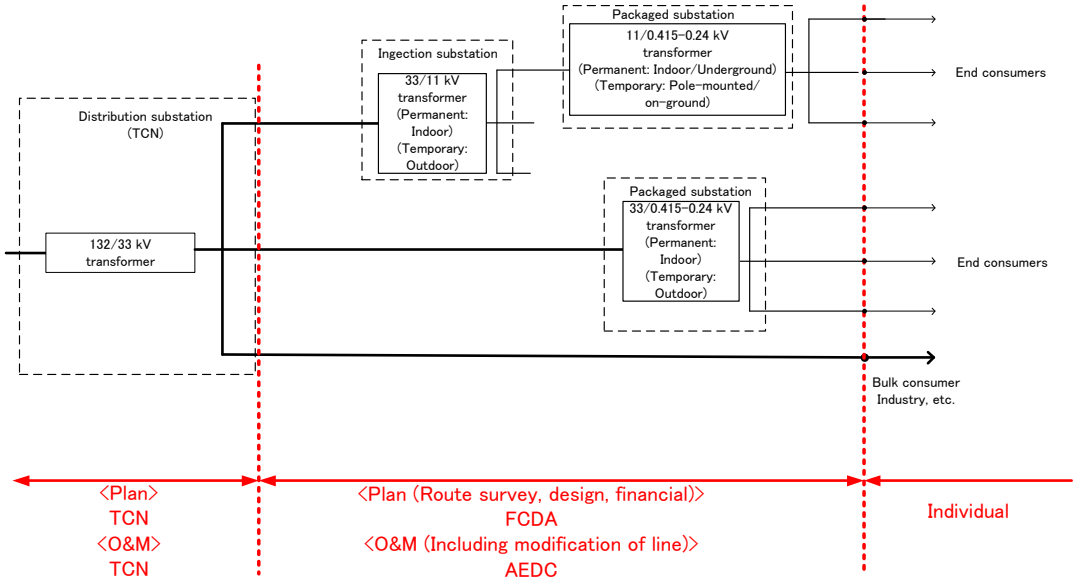
The work demarcation for power distribution in FCC is as illustrated inFigure 8.1.16. TCN operates 132/33 kV substations and outgoing 33 kV feeders over these substations. According to ESD, planning and construction of new 33 kV feeders are managed by ESD. In addition, the planning and construction of 33/11

kV injection substation, 11 kV underground cables, 11 kV/ LV packaged substation and installation of low voltage underground cables will be managed by ESD as well.

Currently, however, according to ESD, the distribution network in FCC is formed by overhead lines. These presently-used facilities are regarded as 'temporary' facilities.

According to ESD, after the commissioning, the distribution facilities are handed over to AEDC.

According to ESD, if the extension of distribution network is required after the handing over, AEDC shall conduct the necessary modification work as a part of its operation work.



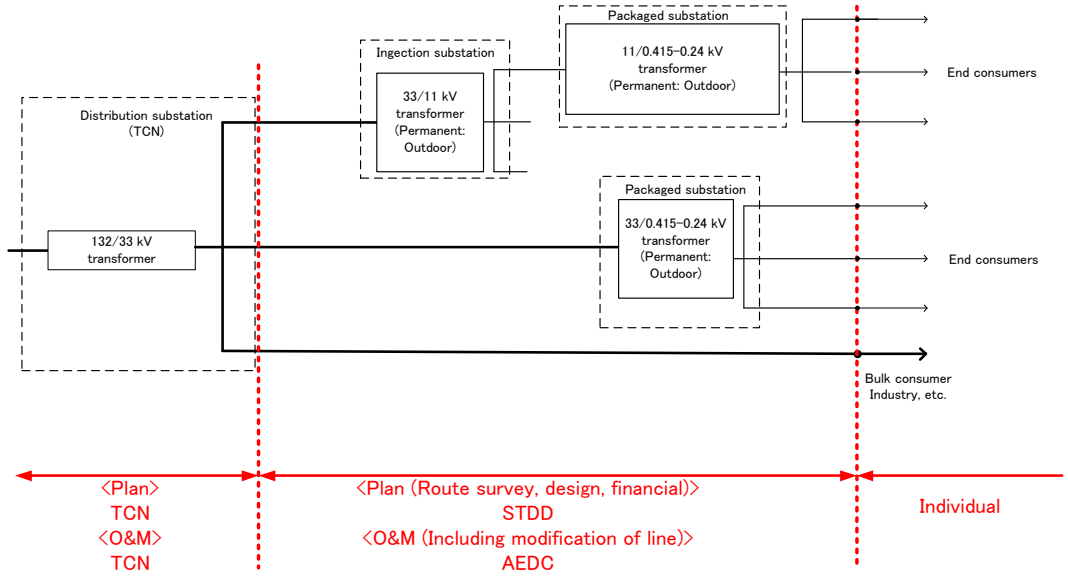
Source: Prepared by the JICA Study Team based on the discussion with ESD

Figure 8.1.16 Work Demarcation for Distribution Network in FCC (ESD-AEDC)

8.1.2.4 Work Demarcation between STDD and AEDC (Satellite Towns)

The work demarcation for power distribution in the satellite towns is shown inFigure 8.1.17.

Except for changing the department in charge of planning from ESD to STDD, the concept of work demarcation is the same as that of the relationship between ESD and AEDC. The distribution lines, however, regardless of the voltage class shall be formed with overhead lines.



Source: Prepared by the JICA Study Team based on the discussion with STDD

Figure 8.1.17 Work Demarcation for Distribution Network in Satellite Towns (STDD-AEDC)

8.1.3 Relevant Law and System

FCDA utilizes the Abuja Development Control Manual (2007) for the network planning. This manual regulates the maximum load capacity of 11 kV power cables as 5 MVA. Also, the fault capacities of 33 kV and 11 kV power cables are set as shown in Table 8.1.10.

Table 8.1.10 Allowable Fault Capacity of Power Cables

Voltage (kV)	Fault level (MVA)
33	1,000
11	350

Source: Prepared by the JICA Study Team based on Abuja Development Control Manual (2007)

This manual also guides the voltage class to be connected to bulk consumers. For commercial and/or industrial facilities which need load capacity above 500 kVA but below 2.5 MVA, the voltage of incoming feeder should be 11 kV. In the same way, for commercial and/or industrial facilities which needs load capacity above 2.5 MVA but below 5.0 MVA, the voltage of incoming feeder should be 33 kV.

8.1.4 Challenges and Suggestions (Preliminary)

Based on the current survey period, the following four items are observed.

(1) Upgrading of 132/33 kV substation facilities

The power distribution network starts from the secondary side of 132/33 kV transformers which are located in the transmission substation operated by TCN. According to the power demand forecast, the total power demand in FCT and the distribution is expected to reach 2,182.0 MVA by 2030, which is beyond the total capacity of the 132/33 kV transformers in FCT. Therefore, the JICA Study Team recognizes that the upgrading of existing substation and/or the new construction of transmission substations will be required.

(2) Preparation for the distribution network master plan for the satellite towns

Considering the forecasted power demand and present facilities, the JICA Study Team recognizes that the upgrading of distribution facilities in the satellite towns is urgent. According to STDD, at present, power demand for the entire satellite towns area has not been forecast. Also, since majority of distribution system at present is radial, it is necessary to take countermeasures against power outage during the rehabilitation work period. In conclusion, plenty of issues that need to be considered are found in the distribution network of the satellite towns. Considering the above issues, the JICA Study Team recognizes that it is necessary to prepare the distribution network master plan for the satellite towns.

(3) Revision of power demand forecast in FCC

According to ESD, ESD has the data on the power demand forecast for Phase I to Phase III, but it does not specify the targeted year. Therefore, the JICA Study Team recognizes that it becomes difficult to prepare the future plan for the rehabilitation of the distribution facilities.

The JICA Study Team recognizes that it is recommended that EDS revise the power demand forecast with a target year, and provide fundamental data for the examination of future plans.

(4) Examination of the appropriate distribution network installation method in FCC

Underground cables shall be applied to all the distribution network in FCC. However, the JICA Study Team recognizes that it is recommended to examine the feasibility of this concept as the securement of land, route and budget become difficult in developed urban areas. The revision of the concept such as the application of distribution line method (overhead lines/underground cables) depending on areas could be considered.

8.2 Telecommunication

8.2.1 Upper Plan, Relevant Policy and Projects

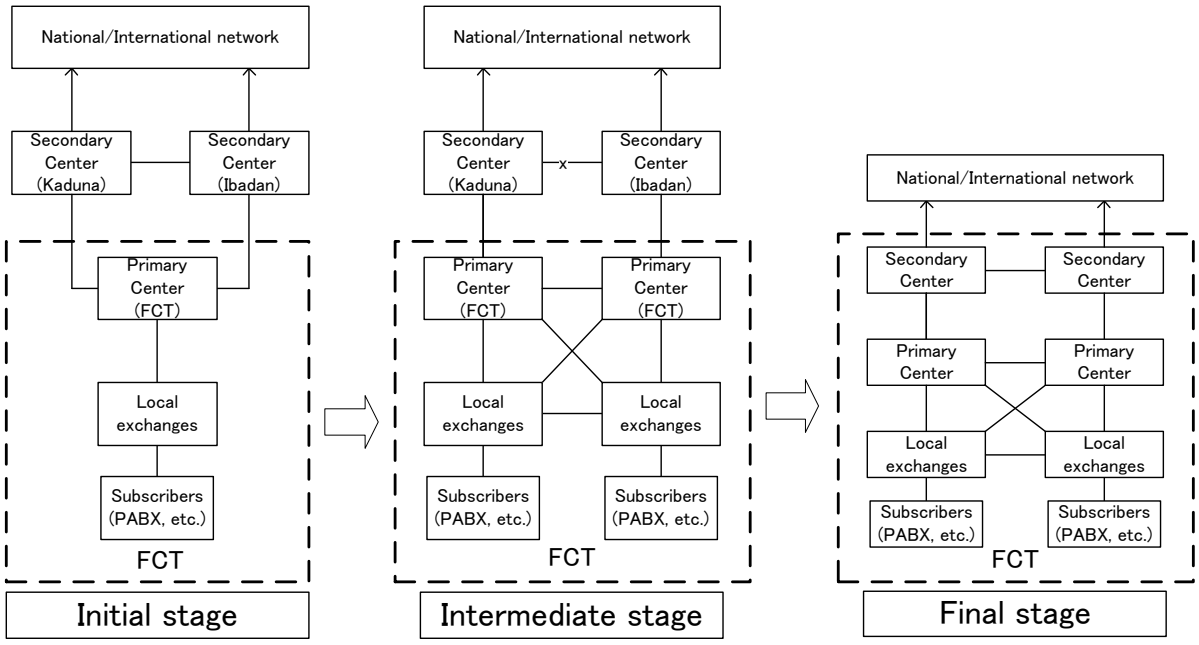
The Master Plan for Abuja –The New Federal Capital of Nigeria- (1979) (hereinafter referred to as 'AMP') foresees the telecommunication system targeting fixed phones and telex in the short-term and the broadband system in the long-term. It particularly points out the necessity of telecommunication system based on the digital technology, Pulse Code Modulation method (PCM).

Under this method, the telecommunication system in FCT shall be in a hierarchy form: local exchanges-primary center-secondary center-interstate/overseas network. Figure 8.2.1 shows the concept of development of telecommunication network.

At the initial stage (Figure 8.2.1 Left), the telephone subscribers shall be connected to one of local exchanges, which will be constructed in FCT. These local exchanges are connected to the primary center to be newly constructed in FCT. Then, it will be connected to the existing secondary centers in Ibadan and Kaduna, reaching the nationwide network. These connections were assumed to utilize microwaves, which are relatively easy to be newly installed.

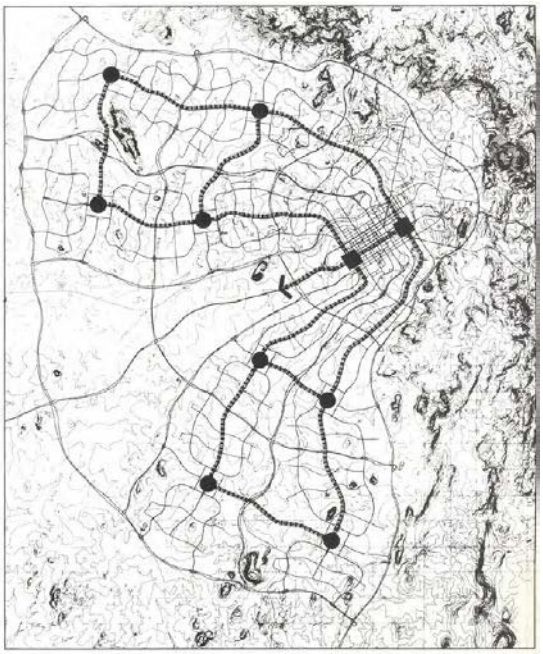
As the transaction data volumes will increase in proportion to the population growth in FCT (Figure 8.2.1Center), an additional Primary center will be constructed in FCT. Also, through the establishment of mutual communication network, the system reliability will improve. Moreover, through the replacement of microwave system to the wiring system such as optic fiber cables, the reliability will be bolstered more.

In the final stage (Figure 8.2.1 right), secondary centers shall be constructed in FCT, and the optic fiber cables will be the primary communication method. In this stage, optic fiber cable ducts are planned to be installed in line with roads and/or 132 kV underground cables. Figure 8.2.1 shows the planned telecommunication network in FCT.



Source: Prepared by JICA Study Team based on AMP

Figure 8.2.1 Concept of Development of Telecommunication System in FCT based on AMP

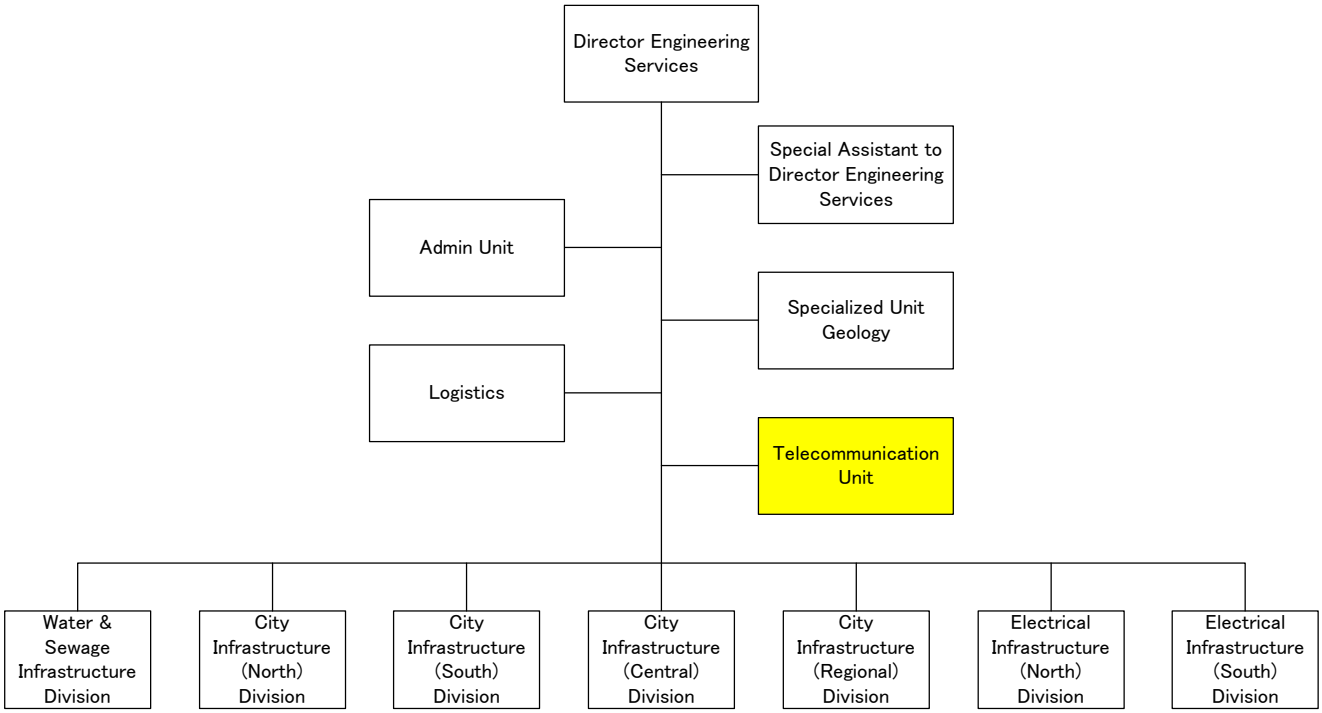


Source: AMP
Note: Black circles mean primary centers and black squares mean secondary centers.

Figure 8.2.2 Final Stage of FCT Telecommunication Network based on AMP

8.2.2 FCDA's Work on Telecommunication System

According to the Telecommunication Unit, FCDA, the Telecommunication Unit under the Engineering Services Department (ESD) undertakes technical tasks related to the telecommunication system. Figure 8.2.3 shows the position of this unit in ESD.



Source: JICA Study Team

Figure 8.2.3 Location of Telecommunication Unit in ESD Organogram

8.2.2.1 Upper Plan and FCDA's Work Outline

In 2012, the Presidential Committee on Broadband formulated Nigeria's National Broadband Plan 2013-2018. This plan points out that Abuja is one of the cities, like Lagos and Port Harcourt, where the development of optic fiber cables and ducts (which are the prerequisite facilities for the current telecommunication system) is remarkable.

The broadband coverage roadmap of this plan lists the work demarcation among federal government, local government, and other stakeholders. The works assigned to the local government (that is FCDA for FCT) are shown in Table 8.2.1.

Table 8.2.1 FCDA's Work Demarcation on the Telecommunication Sector

Number	Item	Description
1	Policy & Regulation	Enable expedited ROW permits for the rapid rollout of base station
2	Enabling Infrastructure	Incentivize rollout of fiber infrastructure
3	Driving Demand	Set up public access points and ICT Training centers
		Connect schools, colleges and hospitals
4	Building Fiber Infrastructure	Build Metro fiber networks in all the major cities and state capitals

Source: Prepared by the JICA Study Team based on Nigeria's National Broadband Plan 2013-2018

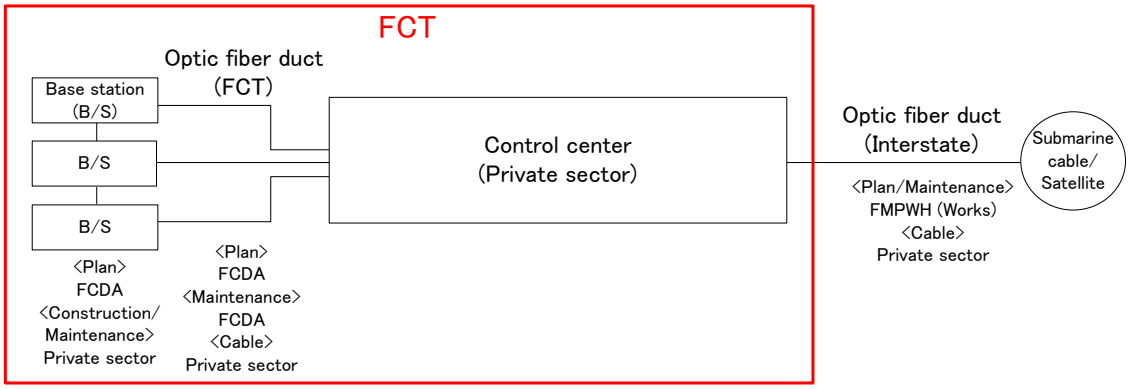
Regarding No. 2 and No. 4, according to the Telecommunication Unit, FCDA plans and maintains the optic fiber ducts necessary for the expansion of cable network in FCT. Through the use of the duct, private telecommunication companies are able to develop their optic fiber network.

Regarding No.1, according to the Telecommunication Unit, FCDA accelerates the private telecommunication companies' construction of base stations through securing lands necessary for new base stations.

Regarding No. 3, however, the JCIA Study Team recognizes that the setting up broadband access points in FCT has not progressed smoothly. When FCDA sets up these points, it is necessary to conclude the broadband contract with private communication company (ies). However, according to the Telecommunication Unit, FCDA could not secure the budget for the conclusion of contract (s).

8.2.2.2 Present Situation of Telecommunication Sector

At present, the telecommunication system in FCT is comprised of microwave and optic fiber cables. The entire system is shown in Figure 8.2.4. According to the Telecommunication Unit, the base stations communicates with each other mainly through the optic fiber cables and microwave system. Finally, the optic fiber cables connect to the control centers which are owned and operated by each private telecommunication company. After the control center, the data will be connected to the interstate optic fiber network.



Source: Prepared by the JICA Study Team based on the discussion with FCDA

Figure 8.2.4 Work Demarcation on the Telecommunication Facilities

According to the Telecommunication Unit, interstate optic fiber cables are laid in ducts which are installed along with interstate roads (called as federal roads). The plan and maintenance of these ducts are conducted by the Federal Ministry of Power, Works, and Housing (Works). Figure 8.2.5 shows the interstate optic fibre cable network in Nigeria.

Source: Nigeria's National Broadband Plan 2013-2018

Figure 8.2.5 Interstate Optic Fibre Cable Network in Nigeria

8.2.2.3 Telecommunication Network Facilities

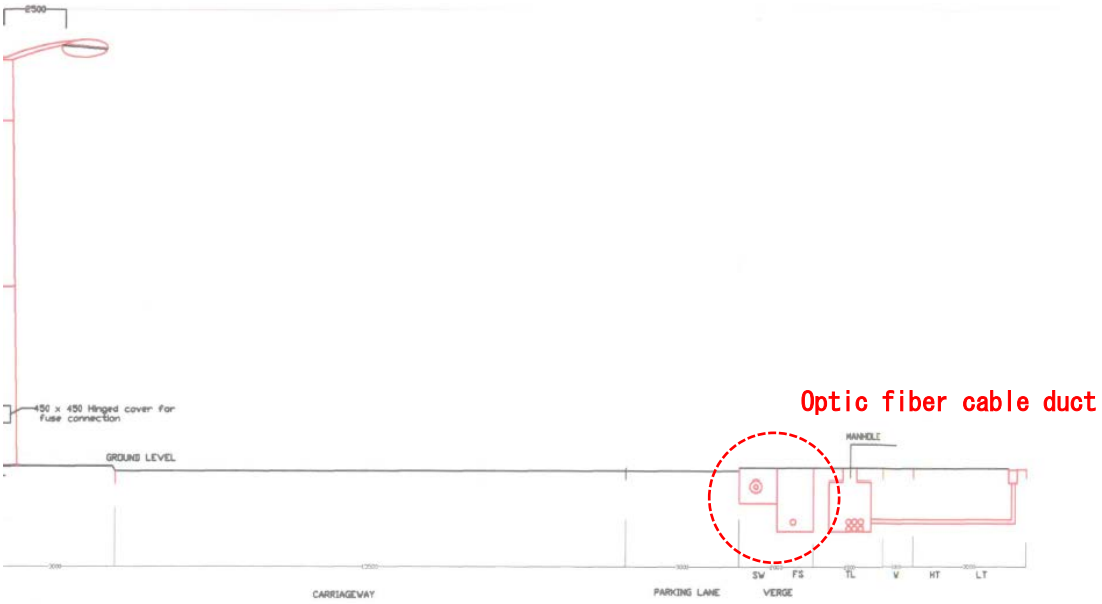
(1) Expansion of ducts

According to the Telecommunication Unit, optic fiber cable ducts are buried in line with primary roads, and new construction of ducts are carried out in line with the construction of these roads. Table 8.2.2 shows examples of roads categorized as primary roads, and Figure 8.2.6 shows an example of buried optic fiber cables.

Table 8.2.2 Examples of Primary Roads

Road category	Scale	Example
Artery/Collector Road	Large	Sani Abacha Way (Street along with the National Mosque towards Sheraton Abuja Hotel)
Major Access Road	Middle	Ladi Kwali Street (Street in front of Sheraton Abuja Hotel)
Local Road	Small	Suez Crescent, Gurara Street (Streets located in the residential area next to Sheraton Abuja Hotel)

Source: Prepared by the JICA Study Team based on the discussion with FCDA



Source: Jahi District Tender Drawings (2007)

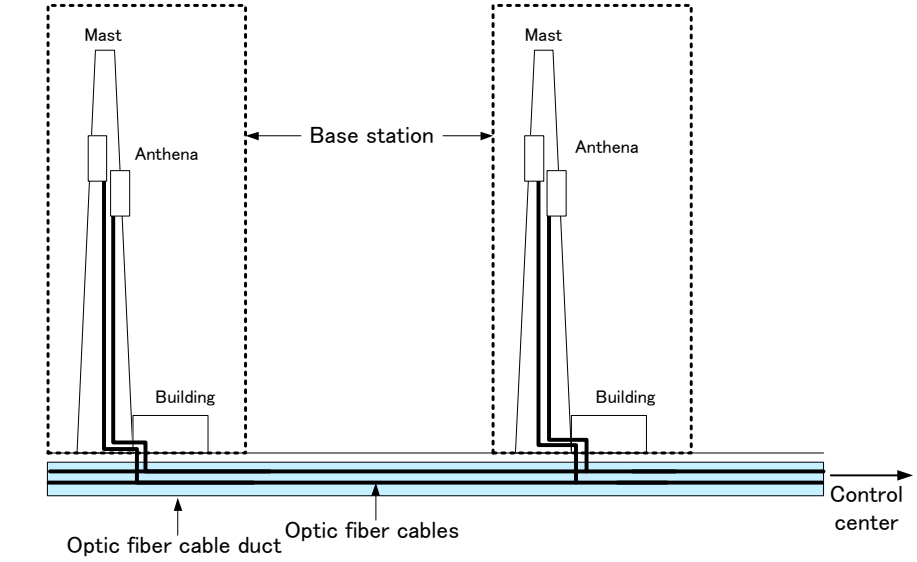
Figure 8.2.6 Example of Underground Optic Fibre Cable Ducts

According to the Telecommunication Unit, as construction of ducts are conducted in line with the construction of primary roads, the ducts expansion map correspond to the primary road map. Also, according to the Telecommunication Unit, the duct size is sufficient for the cables needed to meet the future demand, and the expansion of duct size will not be required.

According to the Telecommunication Unit, installation of optic fiber cables is determined by each telecommunication company. FCDA's task is the planning and maintenance of ducts. The expansion of cable ducts to the satellite towns area will be conducted as required.

(2) New installation of base station

The concept of base station, which is comprised of mast and building, is shown in Figure 8.2.7. Photo 8.2.1shows a typical example of base stations. According to the Telecommunication Unit, FCDA secures the land for the base stations and private companies such as 'IHS Towers' install. FCDA collects land lease fee (called as 'ground lease fee') from the company in charge of operation and maintenance of each base station.



Source: JICA Study Team

Figure 8.2.7 Base Station Facilities

Source: JICA Study Team

Photo 8.2.1 Typical Example of Base Stations

8.2.2.4 Maintenance of Ducts

Telecommunication Unit maintains the ducts installed in FCT. The maintenance methods differ depending on area, FCC or satellite towns. A Telecommunication Unit patrols primary roads in FCC twice every day to detect faults. The main causes of faults are caused by vandalism such as stealing duct covers and breaking optic fibers. When covers are stolen, the Telecommunication Unit procures the alternative through the procurement department. In the satellite towns, regular patrolling is not conducted. When residents find faults, they report to FCDA, which will take necessary countermeasures accordingly.

8.2.3 Challenges

As the Nigeria's National Broadband Plan 2013-2018 points out, ducts are relatively well developed in Abuja. However, in this context, Abuja seems to indicate the FCC area. Based on the discussion with FCDA, the JICA Study Team recognizes that the necessity of the extension of the ducts in the satellite towns areas is recognized.

On the other hand, the JICA Study Team recognizes that the extension of ducts could be realized with construction of a new road. Therefore, the JICA Study Team recognizes that it is desirable that the Telecommunication Unit closely communicate with the department of the road sector to achieve the development of cable ducts in the future.

Chapter 9 Solid Waste and Environmental and Social Considerations

9.1 Solid Waste

9.1.1 Upper Plan, Relevant Policy and Projects

9.1.1.1 Policy Related to Solid Waste Management

The "National Policy on Solid Waste Management (2018)" shows the basic solid waste management policy of Nigeria. A draft of the policy has been prepared, and it is currently waiting for the approval. Table 9.1.1shows an outline of this policy, and Table 9.1.2 shows a compilation of the policy and regulation concerning the waste management.

Table 9.1.1 Outline of National Policy on Solid Waste Management (2018)

Items	Description
Name	National Policy on Solid Waste Management
Year	2018
Policy Statement	Solid waste shall be harnessed as a resource to promote economic growth and managed to improve the quality of human and environmental health.
Vision	An environment that is healthy and safe through implementation of environmentally sound and ethical solid waste management system that will be a wealth generation resource and job creation vehicle.
Contents of the Policy	This document is divided into two parts: Part I: / An introduction providing a background to waste management issues in Nigeria, / An overview of existing legislations, institutional arrangements and responsibilities for waste management, / Situational analysis including the rationale for a national solid waste management policy. Part II: Articulation of the national policy for solid waste management in Nigeria. Contents Part I 1. Introduction 2. Review of existing policies, laws, regulations and institutional frameworks Part II 3. Articulation of solid waste management policy 4. Institutional framework and responsibilities 5. Technical guidelines 6. Supporting implementation strategy 7. Policy implementation, monitoring & evaluation Annex

Source: JICA Study Team

Table 9.1.2 Policy and Regulation related to Solid Waste Management

Policy / Regulation	Descriptions
Policy	
National Policy on the Environment (2016)	The purpose of the Policy is to define a framework for environmental governance in Nigeria.
National Environmental Sanitation Policy (2005)	In this policy document, environmental sanitation is defined as the principles and practice of effecting healthful and hygienic conditions in the environment to promote public health and welfare, improve quality of life and ensure a sustainable environment.

Policy / Regulation	Descriptions
Regulation	
National Environmental (Sanitation and Wastes Control) Regulations, S. I. No. 28 of 2009	The purpose of this regulation is to provide the legal framework for the adoption of sustainable and environment friendly practices in environmental sanitation and waste management to minimize pollution.

Source: JICA Study Team

9.1.1.2 Current urban plans

Master Plan focused on solid waste treatment in the FCT is not prepared. The following plan and report focusing on the FCC are developed based on the AMP (1979):

- Concept plan for the solid waste collection and disposal system for the Federal Capital City, Abuja (1981) (hereinafter Concept Plan)
- Report of the committee on the development of comprehensive road map for effective solid waste management in the FCT (2016) (hereinafter Road Map)

A draft of the Concept Plan was developed in 1981 and later on finalized. The finalized Concept Plan is attached as one of the Appendices of the report of the Road Map.

9.1.1.3 Relation with AMP and other plans

The AMP (1979) identifies 2 possible waste disposal sites (GOUSA and GAUBE), and the Road Map (2016) shows the specific locations of the sites (Figure 9.1.1 and Figure 9.1.2).

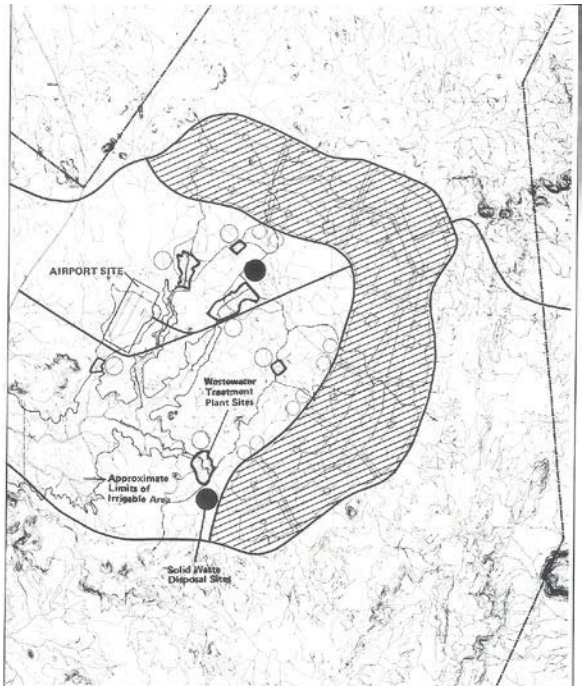


Figure 9.1.1 Location of Disposal Sites in AMP(1979)

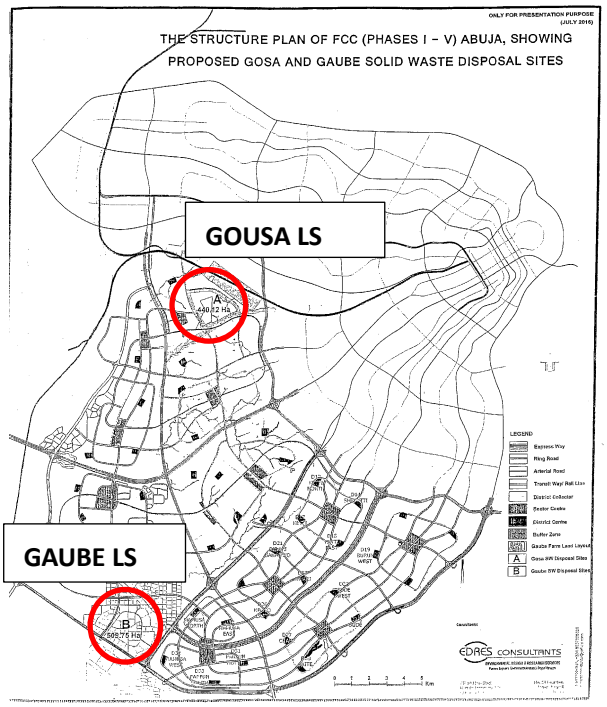


Figure 9.1.2 Location of Disposal Sites in the Road Map (2016)

Source: Abuja Master Plan (1979), Report of the committee on the development of comprehensive road map for effective solid waste management in the FCT (2016)

9.1.1.4 Gap between Plan and Current Situation

The existing disposal site, the GOUSA landfill site, is allocated based on the AMP (1979). Although the AMP (1979) described the disposal site as a sanitary landfill site, in reality, the GOUSA landfill site has only a fence, gate and small office (container). The facilities necessary to develop a sanitary landfill site, such as lining, leachate system, gas venting system, are not installed because of financial and technical constraints.

The above information is based on the "Report of the committee on the development of comprehensive road map for effective solid waste management in the FCT", site surveys of the FCC and GOUSA landfill site, and interviews with the Department of Engineering Services Department (solid waste) of FCDA, and AEPB of FCTA.

The AMP (1979) and other plans do not clearly mention about planning of solid waste treatment facility including disposal site for the satellite towns. In fact, STDD manages and operates some of the disposal sites, which are not sanitary landfill sites. Each area council (AC) has its own disposal site, but all disposal site are open dump.

The above information is based on the "Report of the committee on the development of comprehensive road map for effective solid waste management in the FCT", site surveys of the satellite towns, and interviews with the Department of Engineering & Service (solid waste) of FCDA, STDD and AEPB.

9.1.1.5 Current Situation of Solid Waste Treatment

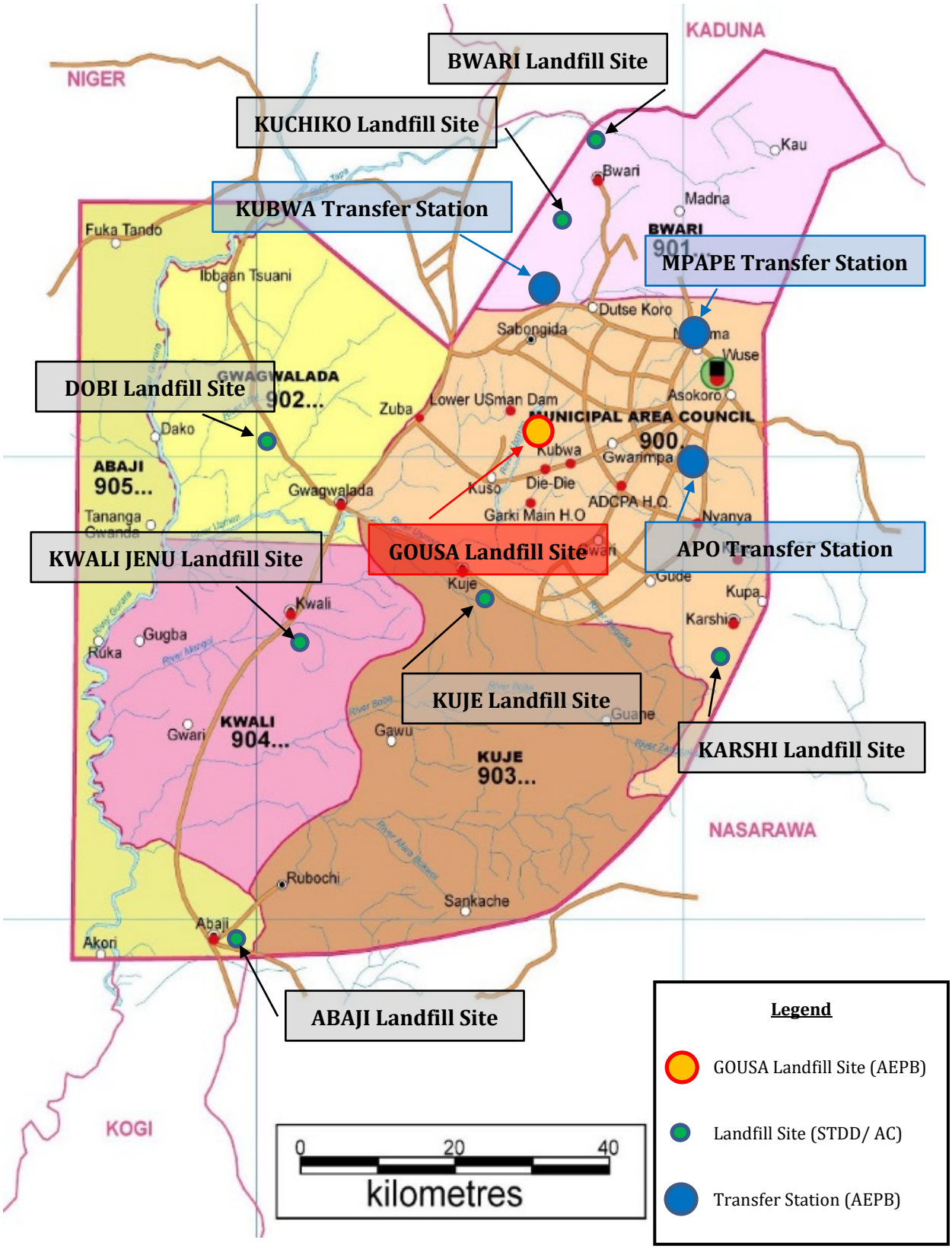
In terms of solid waste treatment practice, AEPB is in charge of the waste treatment in the FCC, and STDD and AC are in charge of satellite towns and 6 area councils.

Regarding the municipal solid waste generated in the FCC, basically several types of containers sold by AEPB are provided by the waste generator, and a private company and AEPB itself provide a door-to-door collection service. There are mainly 3 types of waste collection systems in the FCC: (i) collection by private collection company contracted by AEPB (Lot Contract: all waste generated from households, hotels, restaurants, offices etc. in Lot Contract area, (ii) collection by private collection company registered by AEPB (waste generated from contracted households, hotels/businesses and markets etc.), and (iii) collection by AEPB (waste generated from the market and uncollected/illegally dumped waste). For solid waste collection in the central area of the FCC (such as Phase I and Phase II), AEPB divided the area into 27 lots, and it outsources the service to private collection companies by lot. For the solid waste of mass housing, which is called "estate", a private collection company registered by AEPB provides the service after signing a contract with the estate management board. Similarly, the service in a market is provided by a private collection company which has a contract with market management board or AEPB.

Regarding the final disposal, there is only one official landfill site, GOUSA landfill, which is managed by AEPB.

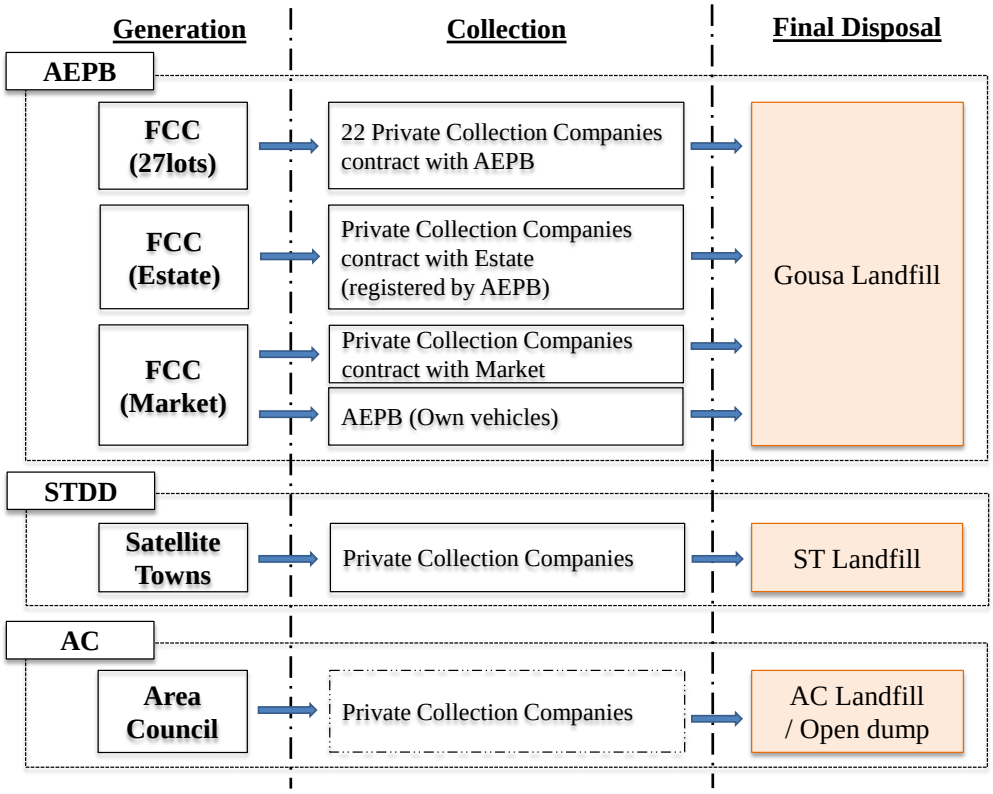
STDD and AC are responsible for the municipal solid waste generated in 6 area councils, and they manage the waste collection and own landfills in the 6 area councils.

The location of the solid waste treatment facility is shown in Figure 9.1.3, and basic flow of the municipal solid waste treatment in the FCT is shown in Figure 9.1.4.



Source: JICA Study Team

Figure 9.1.3 Location of Solid Waste Treatment Facility in the FCT

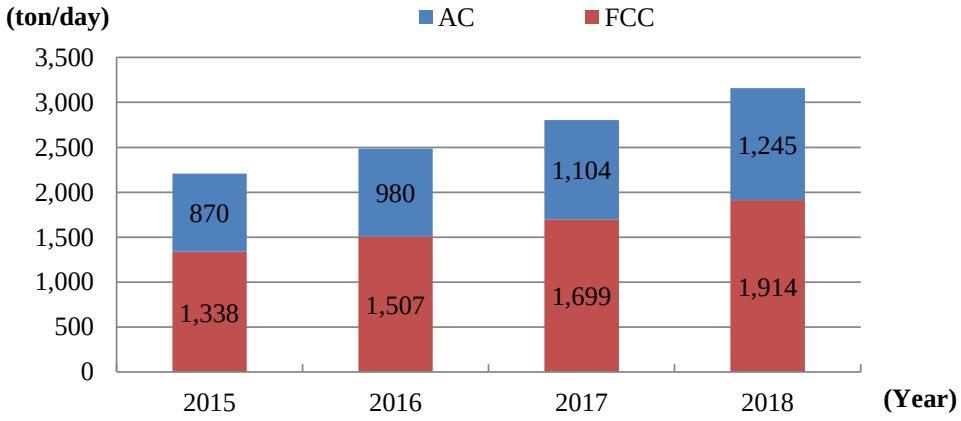


Source: JICA Study Team

Figure 9.1.4 Basic Flow on Municipal Solid Waste Treatment in the FCT

Waste Generation

The amount of waste generation from FCT is increasing year by year. Figure 9.1.5 shows prediction of waste generation of FCC and AC based on the results of waste amount and composition survey in 2015. The amount of waste generation in FCC in 2018 is predicted to 1,914 tons/day and the amount of waste generation in AC is predicted to 1,245 tons/day.

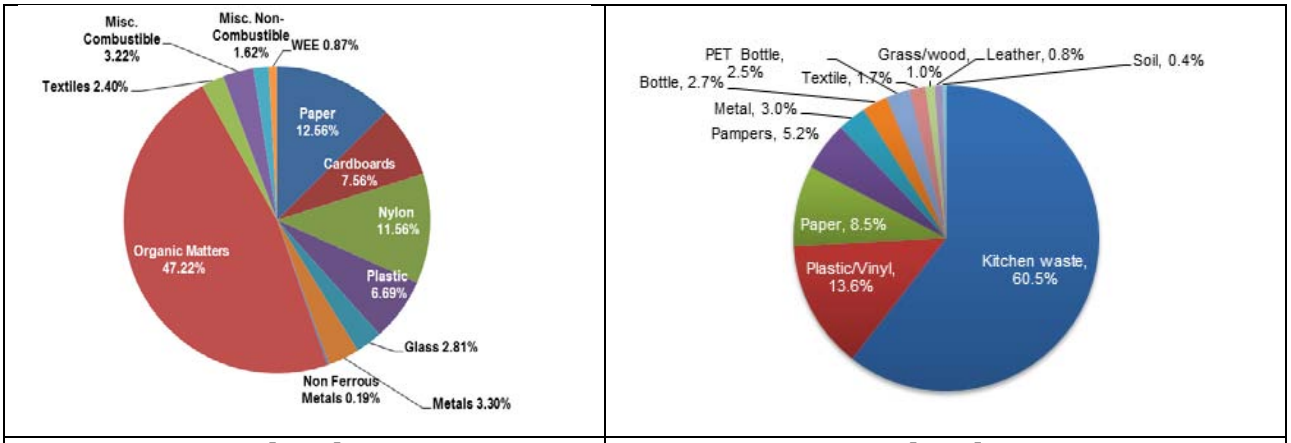


Source: AEPB

Figure 9.1.5 Amount of Waste Generation (Prediction Results)

Waste Composition

AEPB has conducted waste composition survey in 2010 and 2015. Figure 9.1.6 shows the results of these surveys. Kitchen waste is the highest proportion in both survey results. According to the results of the survey in 2015, kitchen waste covers more than 60% of composition, and Plastics, Paper, Glass, and Metal come next.



[2010] [2015]

Source: AEPB

Figure 9.1.6 Results of Waste Composition Survey (2010, 2015)

Waste Collection Service Charge

The monthly rate of waste collection service charge consists of the combined charges for the liquid waste and solid waste which are stipulated in "Waste Management Rates/Charges Regulation 2012". Based on the property type and service area, the different rates are applied.

The groups (Group I, Group II, and Group III) are specified in the regulation mentioned above. The monthly waste collection service charge in the said regulation is shown in Table 9.1.4.

Table 9.1.3 Monthly Waste Collection Service Charge

(Unit: NGN)

Item	Group I S/W	Group II S/W	Group III S/W
I. Residential Property			
Large Detached Duplex	2,500	3,125	3,750
Small Detached Duplex	2,000	2,500	3,000
Semi Detached Duplex	2,000	2,500	3,000
Detached Bungalow	1,500	1,875	2,250
Detached Back House	1,000	1,250	1,500
3-4 Bedroom Flat	750	938	1,125
1-2 Bedroom Flat	500	625	750
Mud House	100	125	150
II. Commercial Property			
1. Hotel	20,000~800,000	25,000~1,000,000	30,000~1,200,000
2. Restaurant	20,000~50,000	25,000~62,500	30,000~75000
3. Leisure Garden and Parks	20,000~50,000	25,000~62,500	30,000~75,000
4. Banks	15,000~42,035	18,750~52,543.75	22,500~63,034
5. Oil Companies	35,000~50,834	43,750~50,834	52,500~50,834
6. Markets	625~4,000	750~5,000	750~18,000
7. Stores/Supermakert	12,000~30,000	15,000~37,500	18,000~45,000
8. Workshops	7,000~32,000	8,750~40,000	10,500~48,000
9. Other Office	10,000~100,000	12,500~125,000	15,000~150,000
10. Construction Sites	225,000~1,200,000	281,250~1,500,000	337,500~1,800,000
11. Engineering, Electrical or other Construction co-office/yard	25,000~160,000	30,000~200,000	37,500~240,000
III. Social Institution			
1. Educational Institutions	2,000~30,000	2,500~37,500	3,000~45,000
2. Clinic/Medical Centers/Pharmacies	2,000~80,00	2,500~10,000	3,000~12,000
3. Government Hospitals	7,500~25,000	9,375~31,250	11,250~37,500
4. Private Hospitals	20,000~100,000	25,000~125,000	30,000~150,000

Source: Waste Management Rates/Charges Regulation 2012

9.1.1.6 Development of the related Facility

As no intermediate treatment is performed in the FCT, only disposal site is under operation as solid waste treatment. The development of three transfer stations (two near but outside the FCC boundary line and one within the FCC) are planned, but none of them has started service. The design of two of the transfer stations has been prepared, but there is a plant to review it. In addition, recycling facility for storage of valuables collected by source separation is developed in the GOUSA landfill site. The outline of each facility is shown below.

(1) Landfill

There is a disposal site managed by AEPB, STDD and AC in the FCT. The GOUSA landfill, which receives waste generated from the FCC, has a fence, gate and a small office, but other facilities required for a sanitary landfill, such as lining, leachate collection system and gas venting system, are not developed. The outline of the GOUSA landfill site is shown below.

Table 9.1.4 Outline of GOUSA Landfill Site

Items	GOUSA Landfill Site
General	
Location (Area council, District)	AMAC, Gousa
Operator	AEPB
Land Owner	Government-owned site
Before Present Landfill	AC open dump site during the 80's
Year Operation Started	2005
Landfill Type	Open dump
Area	91 ha

Items	GOUSA Landfill Site
Soil	Bentonite clay
Operation	
Daily No. of Incoming Trucks	80 – 100 trucks
Daily Dumped Weight	700 – 1,000 ton/day (rough estimate)
Facility	
Internal Road	Main road: Partly paved Branch road: No paved
Fencing	Completely fenced with concrete walls. 2 Entrances (only 1 entrance with pole gate)
Office	Container
Guard House	Concrete house
Weighbridge	Under development
Weighbridge Monitoring House	House only, no equipment installed
Lining	No
Leachate Collection	No
Gas Venting	No
Covering	No

Source: JICA Study Team

Entrance of Landfill (Gate)

Entrance of Landfill (Board)

Access Road

Weigh Bridge (under construction)

Dumping Area for Dry Season

Dumping Area for Rainy Season

Source: Taken by JICA Study Team

Photo 9.1.1 GOUSA Landfill Site

Also, 6 area councils have a disposal site managed by STDD and AC, but most necessary facilities are not well developed and it is based on open dumping.

BWARI Landfill Site

BWARI Landfill Site(Gate)

Source: Taken by JICA Study Team

Photo 9.1.2 BWARI Landfill Site

KARSHI Landfill Site (Dumping Area)

KARSHI Landfill Site (Dumping Situation)

Source: Taken by JICA Study Team

Photo 9.1.3 KARSHI Landfill Site

(2) Transfer Station

Three transfer stations (APO, MPAPE, KUBWA) are planned in the FCT. Some facilities are in place in APO and MPAPE, but the detailed plan of the facility, such as facility treatment capacity, and the operation plan, such as scope of collection area, are not clear. The current status of these transfer stations is shown below.

Table 9.1.5 Current Status of Transfer Stations

Items	APO Transfer Station	MPAPE Transfer Station	KUBWA Transfer Station
Address	1589/1590, Cadastral CAD ZONE, A09, Guzape	3139, Cadastral ZONE, FO4, Mpape	Plot No2, Cadastral ZONE, F12, Jibi, Kubwa
Land owner	Government-owned site	Government-owned site	Government-owned site
Area	1.8 ha	1.6 ha	3.2 ha
Situation	Design is completed Fence is installed Equipment is on the site.	Design is completed Some of the equipment such as weigh bridge was installed long time ago	Only land is secured
Issues	None.	Legal issues due to land reallocation	Compensation for illegal settlement is ongoing

Source: JICA Study Team

APO Transfer Station

Source: AEPB

Figure 9.1.7 Layout of APO Transfer Station

Panoramic View

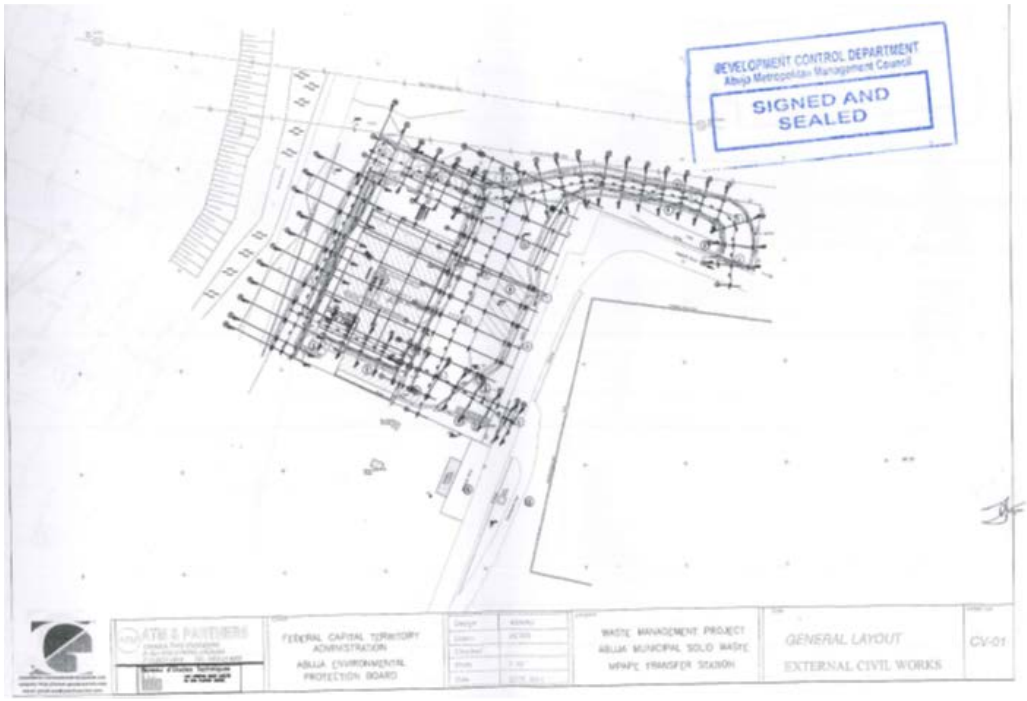
Gate and Fence

Equipment of Transfer Station

Source: Taken by JICA Study Team

Photo 9.1.4 APO Transfer Station

WPAPE Transfer Station



Source: AEPB

Figure 9.1.8 Layout of MPAPE Transfer Station

Internal Road

Completion Monument

Weigh Bridge

Administration Office

Source: Taken by JICA Study Team

Photo 9.1.5 MPAPE Transfer Station

KUBWA Transfer Station

Panoramic View

Source: Taken by JICA Study Team

Photo 9.1.6 KUBUWA Transfer Station

(3) Intermediate Treatment Facility

No intermediate treatment, such as incineration or composting, is carried out in the FCT, and the collected waste is directly transferred to the GOUSA landfill site and it is landfilled.

On the other hand, private companies are actively involved in recycling, aluminium cans, iron products, cardboard, plastic bottles, etc. AEPB is also collecting some valuables in some part of the area, and the collected valuables are transferred to a recycling facility in the GOUSA landfill site.

Recycling Centre in GOUSA Landfill Site

Separation Area

Storage Yard (Glass)

Storage Yard (Plastic)

Source: Taken by JICA Study Team

Photo 9.1.7 Recycling Centre in GOUSA Landfill Site

(4) Actual Cases of Illegal Dumping

Due to largely lack of waste collection and receiving capacity of the landfill site, illegal dumping is observed throughout the FCT, which is a serious problem. Even within the FCC, waste that is not collected has been seen everywhere in the town. Especially in suburbs of the FCC, there are many places such as those shown in the photos below, and there is health damage concern due to the adverse effects on the living environment and deterioration of the sanitary conditions.

Along the Main Road of AC

Stream · Water Channel in FCC

Downtown within AC

Source: Taken by JICA Study Team

Photo 9.1.8 Status of Illegal Dumping

9.1.1.7 Related Project (Planned by other donor)

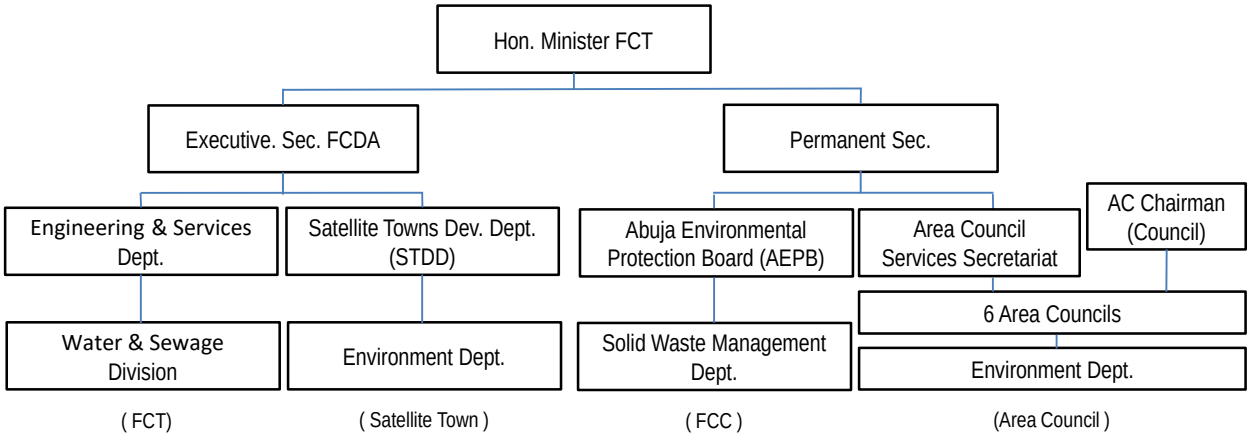
This study could not find concrete development plans on solid waste treatment facility within the FCC initiated by other donors.

FCDA and AEPB, however, have received some proposals for the development of facilities related to waste-to-energy from private companies. The proposals considered the development of waste-to-energy facilities at the GOUSA landfill site, but there is no concrete progress in this regard.

9.1.2 Organization of Solid Waste Management

FCTA is governed by the Honourable Minister of the FCT, who has the responsibility to oversee the activities of all secretariats, departments and agencies in the FCT through the Permanent Secretary and the Executive Secretary. The Department of Engineering Services in FCDA is a technical organization in charge of the plan, design and supervision of the solid waste treatment facilities. AEPB, an agency in the FCTA, is responsible for the waste management including solid waste management in the FCC. On the other hand, the STDD under the FCDA is in charge of the solid waste management in the satellite towns, and the AC is in charge of the solid waste management in each area council excluding the FCC.

The following figure shows the organization structure related to the solid waste management in the FCTA.



Source: JICA Study Team

Figure 9.1.9 Organization Structure related to Solid Waste Management in FCTA

9.1.3 Relevant Laws and Regulations

The following is the outline of the regulation concerning the solid waste management.

Table 9.1.6 Regulation related to Solid Waste Management

Regulation	Descriptions
National Environmental (Sanitation and Wastes Control) Regulations, S. I. No. 28 of 2009	The purpose of this regulation is to provide the legal framework for the adoption of sustainable and environment friendly practices in environmental sanitation and waste management to minimize pollution.

Source: JICA Study Team

9.1.4 Consideration Related to Capacity of the GOUSA Landfill Site

Waste generated from the FCC is transported to the GOUSA landfill site and waste generated from the satellite towns and 6 area council are directly brought into landfill site managed by STDD and each AC. Regarding the solid waste management system in the FCT, it must be considered including the facility development, but under some of assumptions, the operational period when all waste generated in the FCT was transported to the GOUSA landfill site was predicted. Based on the results of the prediction, it can be said that the GOUSA landfill site has 91 ha of land area, therefore the securement of dumping area will not be a serious issue for the time being. On the other hand, considering the existing facilities, there is concern that the influence on the surrounding environment of the landfill site might be a serious problem before the dumping area of landfill site is fulfilled.

Table 9.1.7 The Results of Prediction of the Operational Period of the GOUSA landfill Site

【Condition for Prediction】

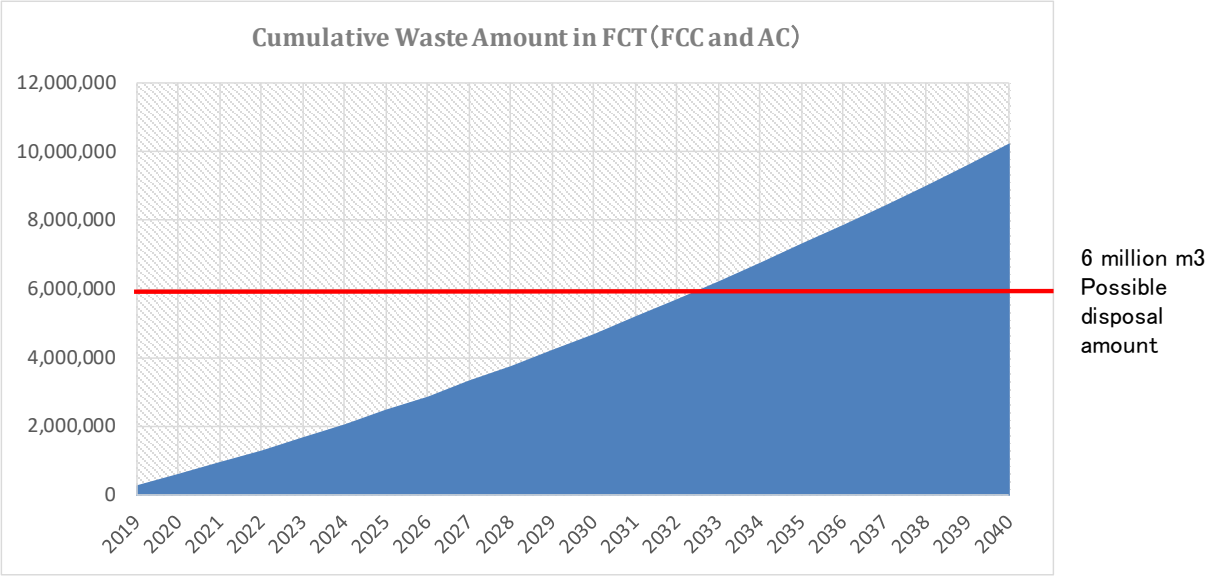
Year		2019	2020	2025	2030	2033	2035	2040
Population of FCT	person	3,095,118	3,277,740	4,209,945	5,119,340	5,690,000	6,071,282	7,179,482

Waste generation rate(FCC)	kg/per/day	0.74
Waste generation rate(AC)	kg/per/day	0.6
Volume density	m3/ t	0.5
Waste Collection rate(FCC)	%	80%
Waste Collection rate(AC)	%	50%

【Results of Prediction】

Year		2019	2020	2025	2030	**2033**	2035	2040
Number of year		1	2	7	12	**15**	17	22
Waste generation per annum	t/year	603,000	637,000	807,000	956,000	**1,037,000**	1,093,000	1,232,000
Cumulative disposal amount	t	603,000	1,240,000	4,934,000	9,414,000	**12,444,000**	14,603,000	20,485,000
Cumulative waste amount	m3	302,000	621,000	2,468,000	4,707,000	**6,223,000**	7,302,000	10,243,000

Source: JICA Study Team



* Set the landfill area to 60 ha and the landfill height to plus 10 m from the current altitude for the site area of 91 ha.

Source: JICA Study Team

Figure 9.1.10 The Results of Prediction of the Operational Period of the GOUSA landfill Site

9.1.5 Issues

Since the AMP was issued in 1979, the Concept Plan and the Road Map have been formulated, but they only recap the policy of disposal site development indicated by the AMP (1979). So far, no master plan comprehensively reviewing the solid waste treatment facility in the FCT has been formulated.

For the GOUSA landfill site, however, the designs for the facilities of the APO and the MPAPE Transfer Stations have been prepared, and some of the related institutions consider these designs as a master plan. Moreover, the revision of the designs is being considered because a long time has passed since the designs were formulated and they are not in line with the current situation.

It is essential for the Department of Engineering Services (solid waste) of FCDA to formulate a master plan for the solid waste treatment facility development covering the entire FCT to establish an integrated waste management.

Through the interviews and discussions with the Solid Waste Management Department of AEPB, the following main challenges on the further planning and implementation are identified:

- ✓ With population increase and urbanization, the amount of waste generation is rapidly increasing and collection area is expanding. Therefore, it is required to strengthen waste collection capacity and disposal facility acceptance capacity in the FCC and satellite towns.
- ✓ It is required that necessary facilities such as transfer station is developed, and then proper waste collection and transportation system which can cover the whole development area is established.
- ✓ It is required that proper intermediate facilities (incineration facility, recycling facility, compost facility etc.) in the FCT are considered and developed while paying attention to the quantity and quality of generated waste.
- ✓ GOUSA landfill site is required to operative throughout the year (both in dry and rainy seasons) to increase its capacity. In addition, it should not affect the surrounding environment. In order to meet the above requirements, the GOUSA landfill site should install necessary facilities such as lining, leachate system, gas venting system and developed as a sanitary landfill site.

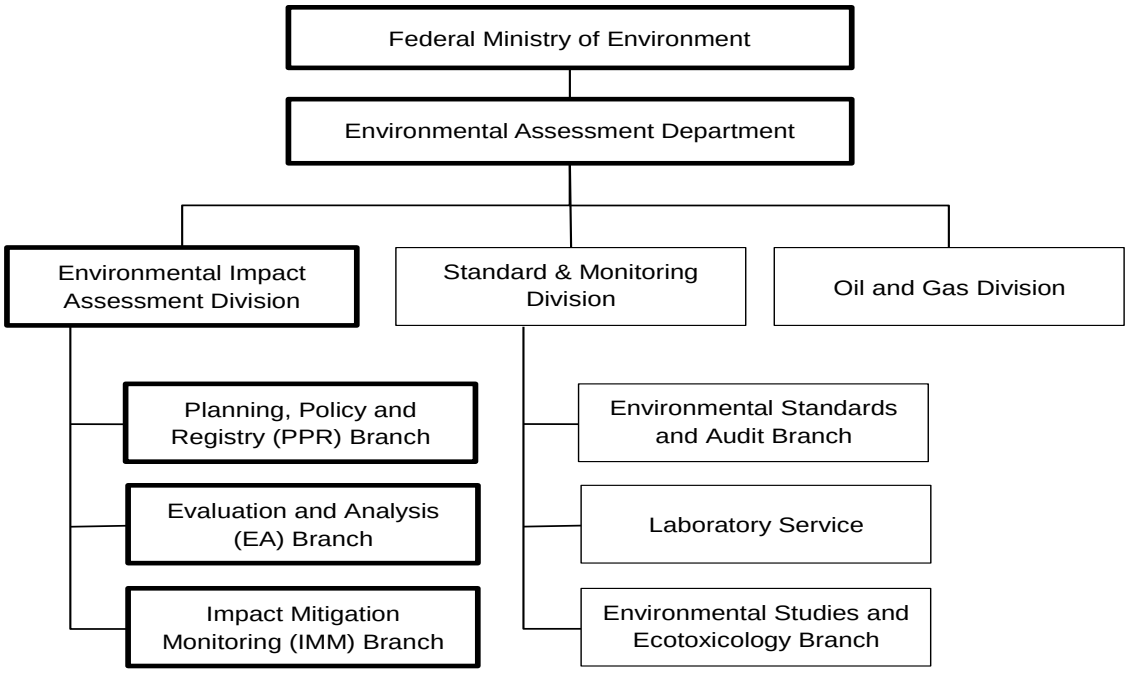
9.2 Environmental and Social Considerations and Other Constraint Conditions

9.2.1 Organizational Structure of Environmental and Social Considerations

(1) Federal Ministry of Environment (FMOE)

The Federal Ministry of Environment (FMOE) is a central agency in charge of the environment management including solid waste management in Nigeria. The FMOE was established in 1999 to administer and integrate environmental protection in Nigeria, including development of national policies concerning environment and natural resources conservation, providing advice to other ministries and agencies, and setting standards and regulation.

The Environmental Assessment Department (EAD) under the FMOE is in charge of the environmental impact assessment (EIA) in Nigeria. The following figure shows the organization chart of EAD. The legal system, procedures, and approval of EIA review are carried out by the Environmental Impact Assessment Division (EIAD). The functions of the various branches of the Environmental Impact Assessment Division are shown in the table below.



Source: JICA report

Figure 9.2.1 Organization Chart of EAD

Table 9.2.1 Functions of Branches of EIAD

Branches	Functions
Planning, Policy and Registry (PPR) Branch	EIA of newly registered projects, collection and management of registration fees, training, workshops, conferences and seminars, accounting, and site inspection of new projects, etc.
Evaluation and Analysis (EA) Branch	EIA scoping, risk assessment, terms of reference (TOR), and the review and evaluation of EIA report
Impact Mitigation Monitoring (IMM) Branch	Monitoring of EIA-approved projects, auditing, and post-project evaluation, etc.

Source: JICA report

(2) National Environmental Standards and Regulations Enforcement Agency (NESREA)

The National Environmental Standards and Regulations Enforcement Agency (NESREA) was established by NESREA (Establishment) Act, 2007 as one of the parastatals. NESREA is in charge of developing and implementing countrywide environmental standards and regulations, and also responsible for strengthening the compliance with international treaties, agreements, and conventions related to environment. Its headquarters is located in Abuja, and NESREA has 6 branch offices and 22 state offices.

(3) State Ministry of Environment

Rather than being the authority to approve EIA, the State Ministry of Environment participates in the technical reviews and review committees of the EIA approval process, and provides advice to businesses in the project formation stage. On the other hand, FMOE is currently considering vesting the right of EIA approval for small-scale projects to the State Ministry of Environment. Some of the states, such as Lagos State, have their own environmental bylaw.

9.2.2 Legal System Related to Environmental and Social Considerations

(1) The Constitution of the Federal Republic of Nigeria

Regarding the environment, the Constitution of the Federal Republic of Nigeria 1999 describes the importance of environmental protection and improvement, and relationship between fundamental human rights and environment as follows.

Article 20:	The State shall protect and improve the environment and safeguard the air, water, land, forest and wild life of Nigeria.
Article 12:	The National Assembly may make laws for the Federation or any part thereof with respect to matters not included in the he Exclusive Legislative List for the purpose of implementing a treaty.
Article 33 and Article 34:	Every person has a right to life, and no one shall be deprived intentionally of his life. Every individual is entitled to respect for the dignity of his person.

(2) Legal System related to Environment

While a comprehensive “environmental protection law” concerning environmental protection, conservation, and management has not been established in Nigeria, environmental laws concerning each environmental topic are enacted.

Table 9.2.2 Laws related to Environment

Name	Description	Year
Endangered Species Act	The Act focus on the protection and management of Nigerian wildlife and some of their species in danger of extinction as a result of overexploitation.	1985
Environment Impact Assessment Act	Any development projects which have potential to give significant adverse impacts on environment are subject to conduct EIA.	1992
Federal National Park Service Act	Protected areas are set up under the Act for natural resource protection, wildlife conservation and maintenance of the national ecosystem.	1999

Source: JICA report

(3) Environmental Regulations

NESREA, which was established in 2007, is responsible for developing and managing environmental standards and other regulations for environmental protection and management. As of January 2019, there are 33 regulations related to the environment.

Table 9.2.3 Regulations related to Environment

Environmental Regulations (33 regulations)	National Environmental (Wetlands, River Banks and Lake Shores) Regulations (2009) National Environmental (Watershed, Mountainous, Hilly and Catchments Areas) Regulations (2009) National Environmental (Sanitation and Wastes Control) Regulations (2009) National Environmental (Permitting and Licensing System) Regulations (2009) National Environmental (Access to Genetic Resources and Benefit Sharing) Regulations (2009) National Environmental (Mining and Processing of Coal, Ores and Industrial Minerals) Regulations (2009) National Environmental (Ozone Layer Protection) Regulations (2009) National Environmental (Food, Beverages and Tobacco Sector) Regulations (2009) National Environmental (Textile, Wearing Apparel, Leather and Footwear Industry) Regulations (2009) National Environmental (Noise Standards and Control) Regulations (2009) National Environmental (Chemicals, Pharmaceuticals, Soap and Detergent Manufacturing Industries) Regulations (2009) National Environmental (Standards for Telecommunications/Broadcasting Facilities) Regulations (2011) National Environmental (Soil Erosion and Flood Control) Regulations (2011) National Environmental (Desertification Control and Drought Mitigation) Regulations (2011) National Environmental (Base Metals, Iron and Steel Manufacturing/Recycling Industries) Regulations (2011) National Environmental (Control of Bush Forest Fire and Open Burning) Regulations (2011) National Environmental (Protection of Endangered Species in International Trade) Regulations (2011) National Environmental (Domestic and Industrial Plastic, Rubber and Foam Sector) Regulations (2011) National Environmental (Coastal and Marine Area Protection) Regulations (2011) National Environmental (Construction Sector) Regulations (2011) National Environmental (Control of Vehicular Emissions from Petrol and Diesel Engines) Regulations (2011) National Environmental (Non-Metallic Minerals Manufacturing Industries Sector) Regulations (2011) National Environmental (Surface and Groundwater Quality Control) Regulations (2011) National Environmental (Electrical/Electronic Sector) Regulations (2011) National Environmental (Control of Alien and Evasive Species) Regulations (2013) National Environmental (Quarrying and Blasting Operations) Regulations (2013) National Environmental (Pulp and Paper, Wood and Wood Product Sector) Regulations (2013) National Environmental (Motor Vehicle & Miscellaneous Assembly Sector) Regulations (2013) National Environmental (Control of Charcoal Production and Export) Regulations (2013) National Environmental (Energy Sector) Regulations (2014) National Environmental (Air Quality Control) Regulations (2014) National Environmental (Hazardous Chemicals and Pesticides) Regulations (2014) National Environmental (Dam and Reservoirs) Regulations (2014)

Source: JICA Study Team

9.2.3 Other Legal Systems Related to Environment Management (including landscape, traditional culture, poor/weak people, ethnic minorities and immigrants)

The main relevant environment management laws identified in this study are shown in Table 9.2.4. Other major laws related to the environment management include traditional culture, ecosystems, land use, water resources etc.

Table 9.2.4 Main Laws related to Environment Management

Name	Description	Year
Forest Law	The Law regulates forest reserve designation, and management.	1956
National Council for Arts and Culture Act	The Act aims at establishing the National Council for Arts and Culture. The council is responsible for planning, coordination, promotion and support of arts and culture activities in the county.	1975
National Commission for Museums and Monuments Act	It concerns the committee to advise on culture, nature, science, etc. It aims to maintain and manage the national museum, ancient art objects, and monuments etc.	1979
The Land Use Act	All land compromised in the territory of each State solely in the Governor of the State, who would hold such land in trust for the people and would henceforth be responsible for allocation of land in all urban areas to individual residents in the State and to organizations.	1990
Immigration Act	In addition to showing stipulations on the whole immigration, rules on immigrants are also indicated.	1990
The Nigerian Urban and Regional Planning Act	The Act aims at overseeing a realistic, purposeful planning of the country to avoid overcrowding and poor environmental conditions.	1992
Water Resources Act	Federal government of Nigeria has a right solely to utilize and manage all surface water, groundwater and any water channels which affects more than 2 states.	1993
National Institute for Cultural Orientation Act	The Act aims at establishing the National Institute for Cultural Orientation to provide decision makers with an orientation on cultural issues	1993
Land Instrument Registration Act	The Act aims at securing land titles and stipulates land instrument registration.	2001

Source: JICA Study Team

9.2.4 Upper Level Plan on Environment

"National Policy on Environment" is a fundamental policy developed for the protection of the environment, and it specifies the framework for environmental governance. The policy goal is to ensure environmental protection and conservation of natural resources for sustainable development.

The initial version of this policy was issued in 1991, but this policy was revised several times since then, and the latest version was issued in 2016.

Table 9.2.5 Outline of the National Policy on Environment

Items	Description
Name	National Policy on the Environment (Revised 2016)
Policy Goal	To ensure environmental protection and the conservation of natural resources for sustainable development'.
Strategic Objectives	To coordinate environmental protection and natural resources conservation for sustainable development
Contents of Policy	Contents 1. Introduction 2. Situation Analysis 3. Goals, Objectives and Guiding principles 4. Conservation and Management of Natural Resources 5. Waste and Environmental Pollution 6. Emerging issues 7. Cross-sectoral Issues 8. Policy Implementation 9. Implementation Strategies and Actions

Source: JICA Study Team

9.2.5 Environmental Impact Assessment (EIA)

(1) General

The Nigerian EIA Act requires all projects that may adversely affect the environment to conduct EIA. Regarding implementation of EIA, EIA Procedural Guideline describes the EIA preparation process (from project planning through the commencement), and its approval procedure for EIA. In addition, several kinds of criteria are indicated for each sector in the environmental regulations mentioned above. Furthermore, some sectoral guidelines in each field are developed.

(2) Project Classification

According to the EIA Act, all development projects are classified into 3 categories depending on the degree of potential environmental impacts. In addition, projects in Sensitive Areas (i.e. with the characteristics described in the table below) shall be classified into Category I.

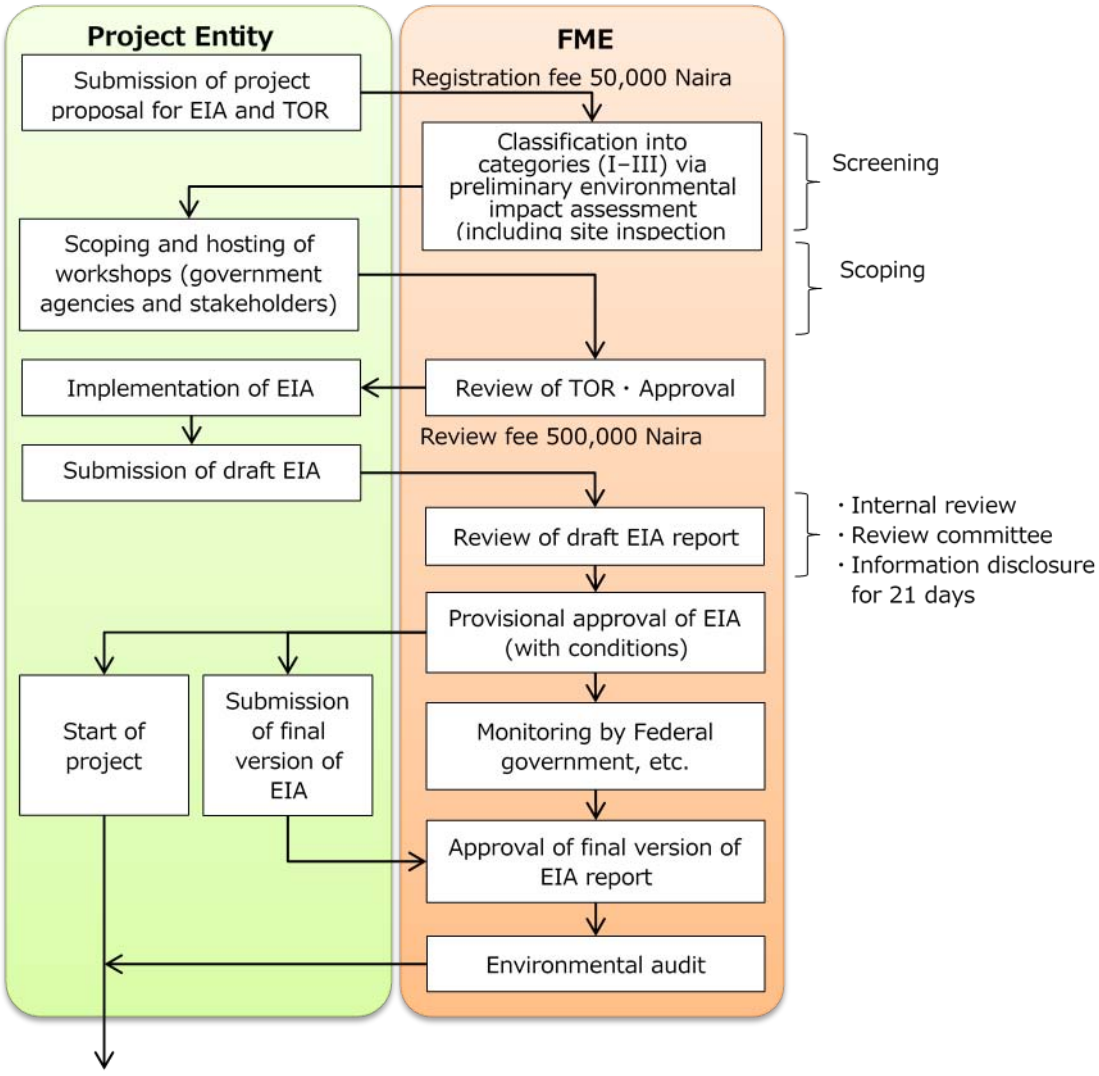
Table 9.2.6 Project Category and Sensitive Areas

<table>
<tr><th>Category</th><th>Description</th></tr>
<tr><td>Category I:</td><td>Full-scale EIA study is necessary for the approval (equivalent to Category A in the JICA guidelines)
<table>
<tr><td>N0</td><td>Sensitive Areas</td></tr>
<tr><td>S-1</td><td>Coral reefs</td></tr>
<tr><td>S-2</td><td>Mangrove swamps</td></tr>
<tr><td>S-3</td><td>Small islands</td></tr>
<tr><td>S-4</td><td>Tropical rainforest</td></tr>
<tr><td>S-5</td><td>Areas with erosion prone soils</td></tr>
<tr><td>S-6</td><td>Mountain slopes</td></tr>
<tr><td>S-7</td><td>Areas prone to desertification (and semi-arid zones)</td></tr>
<tr><td>S-8</td><td>Natural conservation areas</td></tr>
<tr><td>S-9</td><td>Wetland of national or international importance</td></tr>
<tr><td>S-10</td><td>Areas with harbour protected and or endangered species</td></tr>
<tr><td>S-11</td><td>Areas of unique scenery</td></tr>
<tr><td>S-12</td><td>Areas of particular scientific interest</td></tr>
<tr><td>S-13</td><td>Areas of history or archaeological interest</td></tr>
<tr><td>S-14</td><td>Areas of importance to threatened ethnic groups</td></tr>
</table></td></tr>
<tr><td>Category II:</td><td>IEE level study is necessary for the approval (equivalent to Category B in the JICA guidelines)</td></tr>
<tr><td>Category III:</td><td>EIA or IEE study is not necessary for the approval</td></tr>
</table>

Source: JICA Study Team

(3) EIA Administration

The following figure shows a flow chart of the EIA process in Nigeria. Depending on the characteristics of projects, the period from submitting the draft EIA report to the FMOE to the provisional approval is approximately 7 months to 1 year. The EIA and IEE should be conducted by FMOE-registered consultants.



Source: JICA report

Figure 9.2.2 EIA Administration Procedure in Nigeria

(4) Information Disclosure and Stakeholder Meetings

In the EIA Act, the expression "Stakeholder" or "Public participation" is not used and there is no mention of the implementation of stakeholder meeting at the scoping or EIA investigation stage. On the other hand, issues regarding information disclosure and public participation are described as follows at each stage.

Article 7	General:	The Agency (FMOE) shall give opportunity to members of the public etc. to make comment on EIA of the activity.
Article 17	Screening stage:	Every screening or mandatory study of a project shall include comments concerning those effects received from the public.
Article 25	Public comment:	After receiving a mandatory study report in respect of a project, the report shall be available to the public, and any person may file comments with the Agency relating to the conclusions and recommendations of the mandatory study report.
Article 37	Review of draft EIA report stage:	A review panel shall hold hearing in a manner that offers the public an opportunity to participate in the assessment.

(5) Strategic Environmental Assessment (SEA)

No legal system for Strategic Environmental Assessment has been enacted in Nigeria, but clauses related to SEA will be newly added in the revised EIA Law. The clauses to be added are shown below.

54. Strategic Environmental Assessment A Strategic Environmental Assessment shall be required where: (a) a wide range of Government, public and private policies, plans and programmes are to be implemented; (b) small scale projects are required in a statewide or regional basis and the project(s) do(es) not constitute a major project requiring a Stand-alone Environmental Impact Assessment.

58. Power to make Regulations The Minister may make regulations, published in the Gazette- （abbreviated） (d) prescribing a list of plans, policies and programmes for which Strategic Environmental Assessment (SEA) is required.

60. Interpretation "Strategic Environmental Assessment" means a proactive tool that provides decision-makers and Stakeholders with information on the Environmental implications of a Plan, Programme or Policy before major alternatives and directions have been chosen. A Strategic Environmental Assessment is the systematic and comprehensive process of examining environmental effects, significant economic and social effects for the purpose of promoting integrated decision making.

9.2.6 Environmental Quality Standards and Discharge Standards

(1) Environmental Quality Standards

Environmental quality standards for air quality, water quality and noise control are set in Nigeria. Regarding water quality, the environmental quality standards are established for surface water and groundwater, and furthermore, surface water is divided into two types: effluent discharges, irrigation and reuse; and fisheries and recreation. Environmental quality standards for vibration and soil are not set. The respective environmental quality standards are shown below.

Table 9.2.7 List of Environmental Quality Standards

Items	Regulation
Ambient Air	National Environmental (Air Quality Control) Regulations 2014
Water Quality	National Environmental (Surface and Groundwater Quality Control) Regulations, 2011
Noise	National Environmental (Noise Standards and Control) Regulations, 2009

Source: JICA Study Team

Table 9.2.8 Ambient Air Quality Standards

Item	Averaging period	Standards
SO_2	1 year	80 μg/m^3
	24 hours	120 μg/m^3
	1 hour	350 μg/m^3
NO_2	1 year	80 μg/m^3
	24 hours	120 μg/m^3
	1 hour	200 μg/m^3
CO	8 hours	5.0 mg/m^3

Item	Averaging period	Standards
	1 hour	10 mg/m^3
PM10	1 year	60 µg/m^3
	24 hours	150 µg/m^3
O_3	8 hours	100 µg/ m^3
	1 hour	180 µg/ m^3
Lead (Pb)	1 year	1.0 µg/m^3
	24 hours	1.4 µg/m^3
Arsenic (As)	1 year	6,000 µg/m^3
Nickel (Ni)	1 year	20,000 µg/m^3
Cadmium (Cd)	1 year	5,000 µg/m^3
Ammonia (NH_3)	1 year	0.2 mg/m^3
	24 hours	0.6 mg/m^3

Source: National Environmental (Air Quality Control) Regulations 2014

Table 9.2.9 Environmental Water Quality Standards (Surface Water)

Item	Standards	
	Effluent discharges. Irrigation and Reuse	Fisheries and Recreation
Physicochemical properties		
Water temperature	Temperature by a 7-day daily average of the daily maximum temperatures shall not be more than ±0.3 C above natural background conditions (except designated thermal mixing zones)	
DO	≥4.0 mg/l	≥6.0 mg/l
Colour and turbidity	≤10 NTU of background	
pH	6.5 – 8.5	6.5 – 8.5
SS	0.75 mg/l	0.25 mg/l
BOD5	6.0 mg/l	3.0 mg/l
COD	30.0 mg/l	30.0 mg/l
Chemical properties		
NH4+	2.0 mg/l	0.05 mg/l
NO2-	0.08 mg/l	0.02 mg/l
NO3-	40.0 mg/l	9.1 mg/l
Phosphates (PO43-)	3.5 mg/l	3.5 mg/l
Cl-	350 mg/l	300 mg/l
SO42-	500 mg/l	100 mg/l
Oil and grease	0.1 mg/l	0.01 mg/l
Na+	120 mg/l	120 mg/l
K+	50.0 mg/l	50.0 mg/l
Ca2+	180 mg/l	180 mg/l
Mg2+	40.0 mg/l	40.0 mg/l
Total iron (Fe2+/Fe3+)	0.5 mg/l	0.05 mg/l
Hg	0.0005 mg/l	0.001 mg/l

Item	Standards	
	Effluent discharges. Irrigation and Reuse	Fisheries and Recreation
Physicochemical properties		
As	0.05 mg/l	0.05 mg/l
Pb	0.1 mg/l	0.01 mg/l
Cd	0.01 mg/l	0.005 mg/l
Cr6+	0.5 mg/l	0.001 mg/l
Cr3+	0.5 mg/l	0.5 mg/l
Ni	0.1 mg/l	0.01 mg/l
Cu	0.01 mg/l	0.001 mg/l
Al	0.2 mg/l	0.2 mg/l
Zn	0.2 mg/l	0.01 mg/l
CN	0.05 mg/l	0.001 mg/l
Phenols	0.25 mg/l	0.001 mg/l
Radioactivity Σα/Σβ	0.1/1.0 Bq/l	0.1/1.0 Bq/l
Total phosphorus	0.025 mg/l	
Biological properties		
Coli index	100 /l	50 /l
Coli count (lactose positive)	5,000 /l	20 /l
Caliphas	100 /l	100 /l
Pathogens	ND	

Thermal Mixing Zones: Thermal mixing zones are allowed by NESREA. The zone will be limited to not more than one quarter of the cross-sectional area. In wide estuaries and oceans, the limits of mixing zones will be established by the agency.

Source: National Environmental (Surface and Groundwater Quality Control) Regulations, 2011

Table 9.2.10 Permissible Noise Levels

Area, facilities etc.		L_{Aeq} (dBA) Permissible level	
		Daytime	Daytime
Residential	Any building used as hospital, convalescence home, home for aged, sanatorium and institutes of higher learning, conference rooms, public library, environmental or recreational site	45	35
	Residential buildings	50	35
	Mixed residential (with some commercial and entertainment)	55	45
Residential + industry or small scale production + commerce		60	50
Industrial (outside perimeter fence)		70	60
Construction	Hospital, school, institution of higher learning, homes for the disabled etc.	60	50
	Buildings other than those prescribed above	75	65

Source: National Environmental (Noise Standards and Control) Regulations, 2009

(2) Discharge Standards

Standards (regulations) are defined for each sector, and the emission standards of facilities related to each sector are indicated.

9.2.7 Legal System and Procedure Related to Land Acquisition and Resettlement

Land acquisition in Nigeria is executed in accordance with Land Use Act, which is enacted in 1978. According to the law, all land belongs to each state government, and a formal certificate of occupancy by state governments makes a citizen a lawful interest holder in the land. As for public purpose, land can be expropriated with governor's approval.

Those who hold the right of land and those who occupy the land also have a right to receive compensation. The amount of compensation is determined via land surveys conducted by state governments, based on rents, crops, buildings, and equipment. In urban area, methods of compensation may vary by state governors or local government jurisdictions, including providing alternative houses. Cost of the compensation in this regard is disbursed by a project proponent.

The preparation of Resettlement Action Plan (RAP) is not required under the Land Use Act. But in practice, RAP is often required in the EIA process as an approval condition.

9.2.8 Others (Necessary Information for Preliminary Screening)

(1) Population Data

It is difficult to obtain quantitative data for grasping the current situation of socioeconomic and living environment in the FCT. Numerical data is also important for considering the business plan in each sector, particularly the population data. The population census has not been conducted since 2006, and the actual condition of the population of the FCT (satellite towns) and the FCC has not been accurately grasped; therefore, the number of population is often estimated based on the 2006 census.

There is also a low-income region called village in the FCC. For this reason, information on the population and households in each district is necessary for a more detailed plan in the FCC.

(2) Ethnic groups / Tribes

The location of FCT is largely determined by careful consideration for ethnic conflicts existing in Nigeria. Therefore considering the information of the whole ethnic group not limited to ethnic minorities and the balance between ethnic groups having some degree of influence are important.

There are some areas where Emir (King) is rooted in a part of area. In the surrounding of FCT, Emir resides are close in Suleja.

9.2.9 Local Consultants

A large-scale environmental and social consideration investigation is necessary for conducting master plan review. Therefore local consultants information with experience through the investigation and formulation of master plan work (related to international donors) was collected as follows.

Table 9.2.11 List of Local Consultants for Environmental Sector

No.	Nome of company	Address of HQ	Sector
1	Sustainabiliti Limited	Suite 11, 2nd Floor Ruby Block, All Seasons Plaza, 24, Lateef Jakande Street, Opposite Cadbury Nigeria Plc, Agidingbi, Ikeja, Lagos +234 1.816 8657	"Sustainabiliti Limited" is a local consultant who Tokyo Metropolitan Transportation Administration (LAMATA) has hired for the creation of EIA • RAP in order to do environmental and social consideration survey on the JICA Lagos city rail project at 2014.
2	Environment Accord Limited.	36B Oguntona Crescent, Gbagada Phase 1, Lagos State, Nigeria +234 8136363762	"Environment Accord Limited" is a local consultant who JICA has hired to prepare EIA in order to survey environmental and social considerations related to electricity M / P project by JICA.

No.	Nome of company	Address of HQ	Sector
3	JAWURA Environmental Services Limited.	130 Obafemi Awolowo Way, Balogun Bus Stop Opposite Lagoon Hospital Ikeja, Lagos State, Nigeria +234 8033013378	"JAWURA Environmental Services Limited" Is a local consultant who were interested in No 2 projects

Source: JICA Study Team

Summary of Study

DATA COLLECTION SURVEY FOR THE REVIEW AND UPGRADING OF INTEGRATED URBAN DEVELOPMENT MASTER PLAN OF ABUJA, FEDERAL CAPITAL TERRITORY, NIGERIA

SUMMARY

JICA STUDY TEAM
YACHIYO ENGINEERING CO., LTD
NINE STEPS CORPORATION

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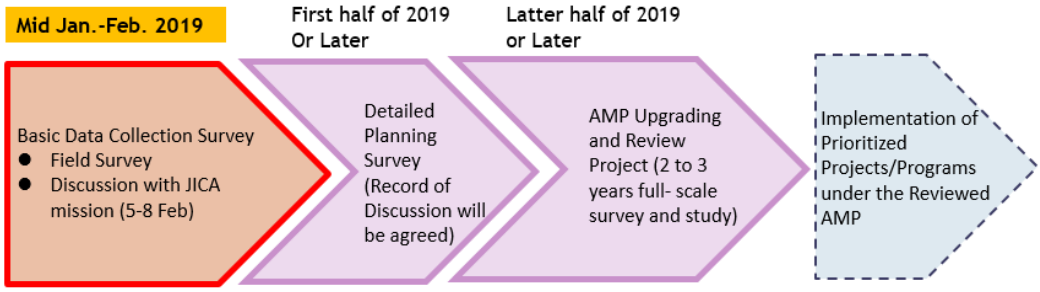
2. Key discussion points

- Findings and thoughts which have to be considered and further discussed in the forthcoming milestones



Milestone of AMP Upgrading and Review, and its implementation

1. RESULT OF DATA COLLECTION SURVEY

1.0 Structure of Issues

Causes (*)

Gap b/w AMP and today's situation in
- Population Distribution for FCC and Satellite
- Spatial Structure in regional development

Uncontrollable Sprawl pressure

*Based on the initial assessment by JICA Study Team. Further analysis required in the AMP Upgrading and Review Project

Effects

Gap b/w needs and services in
- Urban development area
- Land use
- Infrastructure Construction

FCC
- Low urban development to sustain infrastructure facility
- Inappropriate maintenance of infrastructure

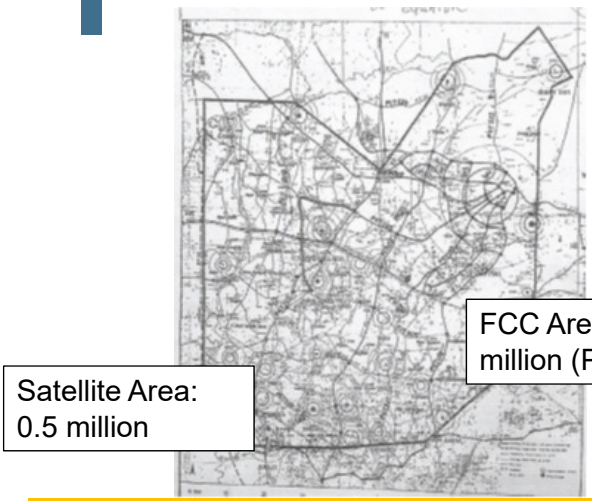
Satellite
- Insufficient Infrastructure supply
- Squatting

Network b/w Satellite
- Insufficient Infrastructure supply

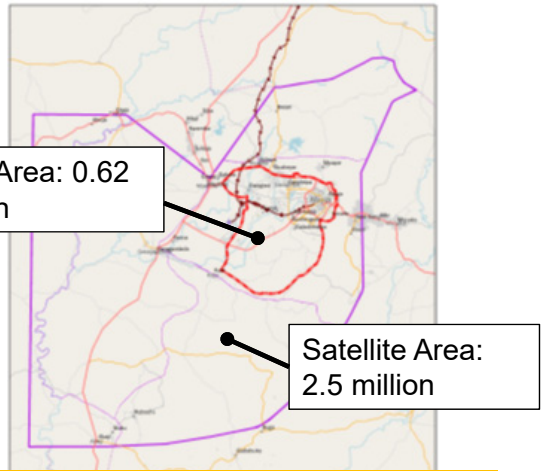
1. RESULT OF DATA COLLECTION SURVEY

1.1 General Issues for realization of Master Plan

- ✓ According to UN population estimation, current FCC area population is 620,000, and other FCT area is about 2.5 million
- ✓ Population distribution in the regional planning level, is quite differ from original AMP estimation.



Original Regional Population distribution (1980s)



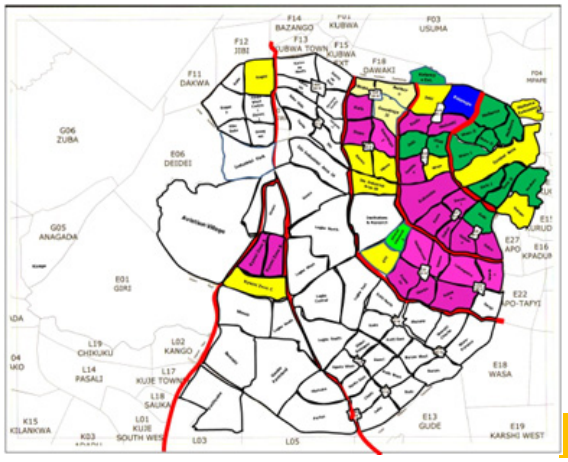
Current Estimated Population distribution

1. RESULT OF DATA COLLECTION SURVEY

1.2 Issues observed by sector

(1) Urban Planning sector

- Delay of urban development in FCC area
- Rapid progress of development in satellite city from AMP
- Difference of social balances b/w FCC and satellite
- Lack of comprehensive social balance within neighborhood district



Phase I Districts	-	80%
Phase II Districts	-	30%
Phase III Districts	-	20%
Phase IV	-	Less than 1%
Phase V	-	Less than 1%

Progress of development of FCC (2017)

1. RESULT OF DATA COLLECTION SURVEY

1.2 Issues observed by sector

(2) Transport sector

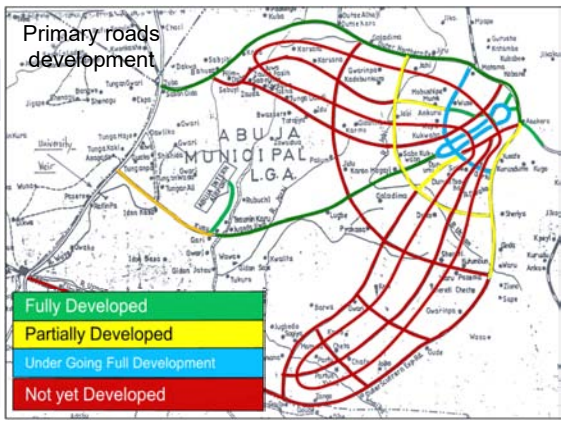
≪FCC Area and Satellite towns≫

- Congestion on the corridors FCC – satellite towns due to insufficient of mass rapid transit (LRT, BRT) and bus network

≪FCC Area≫

- Congestion in several area in the FCC due to poor primary road network, inflow traffic from satellite town, insufficient public transport services, and parking issue

Transport category	Planning / Schedule	Progress / Current status
District roads	Collector Roads Minor Roads Local streets	90 % in phase-1 30 – 40 % in phase 2&3 Less than 5 % in phase 4&5
LRT	286 km (6 lots)	45 km (2 lots)
BRT	7 routes	Nothing
Bus network	Appox.60 routes in the FCC	12 FCC-satellite towns routes, 1 FCC inside route
Parking	33,000 locations	Few off-street parking



1. RESULT OF DATA COLLECTION SURVEY

1.2 Issues observed by sector

(3) Water supply sector

≪FCC Area≫

- Necessity of upgrading "Abuja Water Master Plan" of correspondence to growing population for FCC.
- Delay of construction of water supply network due to delay of urbanization in FCC.

≪Satellite Area≫

- Nothing of master plan for water supply system in satellite town.
- Supplying Water by Kiosk in satellite town.
- Necessity of expanding water purification plant correspondence to growing population.

Phase	Water pipe	Drain pipe
1	100% (completed)	90-100% (Almost completed)
2	100% (completed)	50% completed
3	0% (L/A China Gov.)	0% (D/D completed)
4	0% (D/D signed except a part of district)	0% (To be started soon)
5	0% (Any activity not yet)	0% (Any activity not yet)

Progress of water supply network in FCC (2017)

Water supply by Kiosk in satellite

1. RESULT OF DATA COLLECTION SURVEY

1.2 Issues observed by sector

(4) Sewage sector

≪FCC Area≫

- “Planning study & preliminary engineering design of sanitary sewer system” for the FCC.
- Half of scheduled area in the FCC is completed, but in bad maintenance.

≪Satellite Area≫

- Nothing of master plan for sanitary sewer system in satellite town.
- Lack of sewage systems in satellite and sanitation system in illegal residential area.

Leak of sewage water into river in FCC

Future extension of sewage network

1. RESULT OF DATA COLLECTION SURVEY

1.2 Issues observed by sector

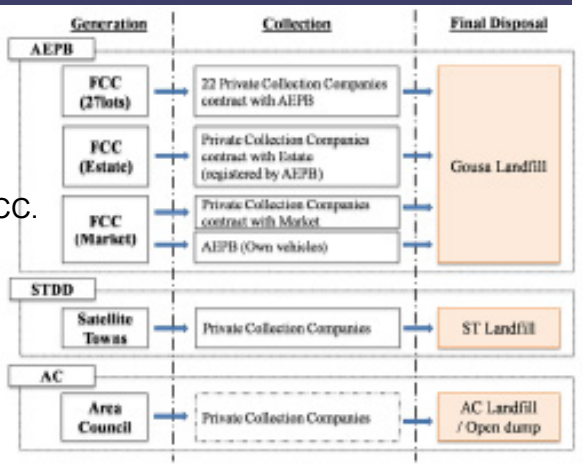
(5) Solid waste management sector

≪FCC Area≫

- Only concept plan for Garbage disposal in the FCC.
- Landfilling collected solid waste in final disposal site or disposal site around the FCC.

≪Satellite Area≫

- Only concept plan (Garbage disposal flow) in the satellite area
- Open dumping.



Garbage disposal flow diagram in FCT

- Necessity of formulating “Solid waste Master Plan” correspondence to growing population for FCC and satellite areas. (Introduction of integrated solid waste management system b/w FCC and satellite)
- Necessity of construction of required waste disposal facilities. (e.g. Intermediate garbage disposal facility / Relay station)

Open Dumping in Kuje （Out of FCC）

1. RESULT OF DATA COLLECTION SURVEY

1.2 Issues observed by sector

(6) Power supply sector

≪FCC Area≫

- Only design concept for power supply in the FCC
- Over design of power supply due to ad hoc capacity setting without capacity estimate, however still insufficient capacity in the FCC

≪Satellite Area≫

- Nothing of power supply master plan, only community basis, in the satellite town
- Delay of power supply in satellite area due to instable fare collection

Unit : MVA

		2020	2025	2030	2035	2040
FCC	Phase I	48	61	78	100	127
	Phase II	29	37	47	60	77
	Phase III	76	97	124	159	202
	Phase IV	76	97	124	159	202
	Phase V	76	97	124	159	202
	Subtotal	**306**	**390**	**498**	**636**	**812**
Satellite town	Amac	159	383	587	833	1105
	Abaji	9	19	27	34	45
	Bwari	75	188	305	408	532
	Gwagwalada	50	126	198	266	358
	Kuje	60	180	317	423	598
	Kwali	14	38	67	90	117
	Subtotal	**367**	**934**	**1,502**	**2,053**	**2,754**

Catenary in the satellite town (final)

1. RESULT OF DATA COLLECTION SURVEY

1.2 Issues observed by sector

(7) Investment and urban development implementation

- Delay of progress of urban development by PPP scheme
- Abandon of construction of urban infrastructures
- Delay of urbanization due to illegal settlement
- Unfeasible financial situations for investment

Delayed construction of housing site

Delay of construction of road due to informal settlement

1. RESULT OF BASIC DATA COLLECTION SURVEY

1.3 Summary of Issues by Area

(1) FCC

- Low urban development to sustain infrastructure facility
- Inappropriate maintenance of infrastructure

Delayed construction of primary roads

Leak of sewage water into river in FCC

1. RESULT OF BASIC DATA COLLECTION SURVEY

1.3 Summary of Issues by Area

(2) Satellite

- Insufficient Infrastructure supply
- Squatting

Suspended construction of market

Informal settlements with water supply by Kiosk

1. RESULT OF BASIC DATA COLLECTION SURVEY

1.3 Summary of Issues by Area

(3) Network b/w Satellite

- Insufficient Infrastructure supply

Insufficient traffic capacity b/w FCC & satellite

Necessity of future development linkage to satellite areas

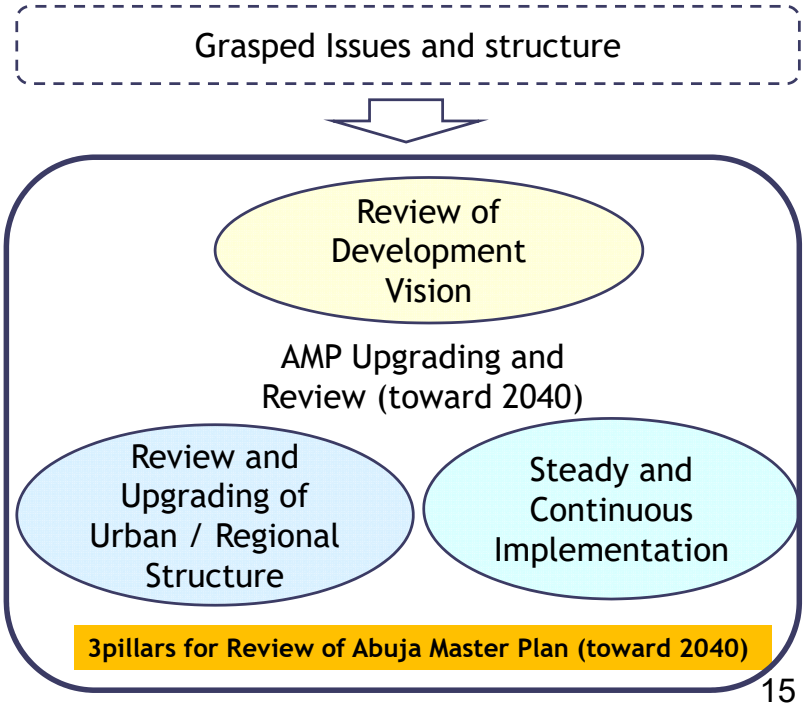
2. CONSIDERATIONS FOR AMP UPGRADING AND REVIEW

Major 3 pillars

Review of Development Vision
- Characteristics of the City
- Direction of the City's Development

Review and Upgrading of Urban/ Regional Structure
- Population distribution
- Urban structure
- Infrastructure network

Steady and Continuous Implementation
- Urban development management
- Comprehensive social environment



2. CONSIDERATIONS FOR REVIEW OF MASTER PLAN

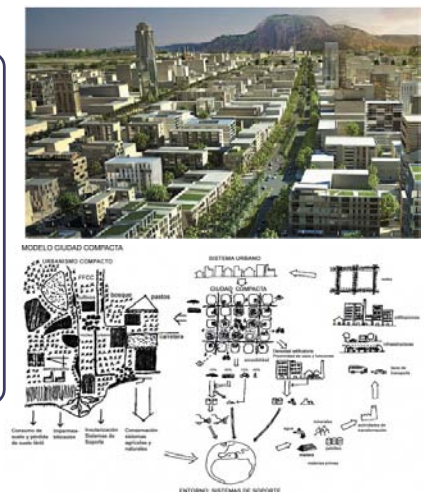
(1) Review of Development Vision

•Review and formulation of plan and program for realization of Development Vision
- Characteristics of the City
- Direction of the City's Development

FCT's roadmap strategies

Social Changes b/w 2020 to 2040

example
- Population
- Demography
- Industrial market
- Development Goal
- .....



Setting of Development Direction and Measures

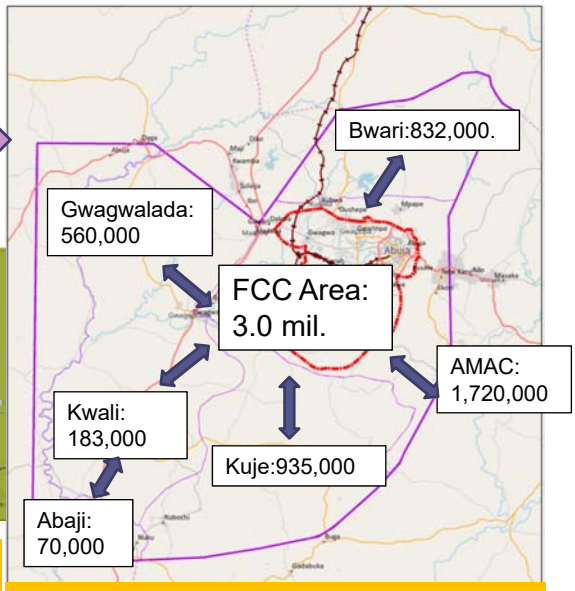
2. CONSIDERATIONS FOR REVIEW OF MASTER PLAN

(2) Review and Upgrading of Urban / Regional Structure

- **Integration of Urban/ Regional plans into ONE- NETWORK**
  - Population distribution
  - Urban structure
  - Infrastructure network

Urban system (2004 phase 5)

Regional transport network plan (infrastructure)



Assumed Population distribution (2040)

2. CONSIDERATIONS FOR REVIEW OF MASTER PLAN

(3) Steady and Continuous Implementation

- **Preparation of Conditions for Steady and Continuous Implementation**
  - Urban development management for adequate investment
  - Provision of comprehensive social environment

Generation of investment climate for Private Investment development

e.g, affordable housing policies to masterplan (Realization of symbiotic society)